Products finishing

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Products Finishing

Keeping Up---

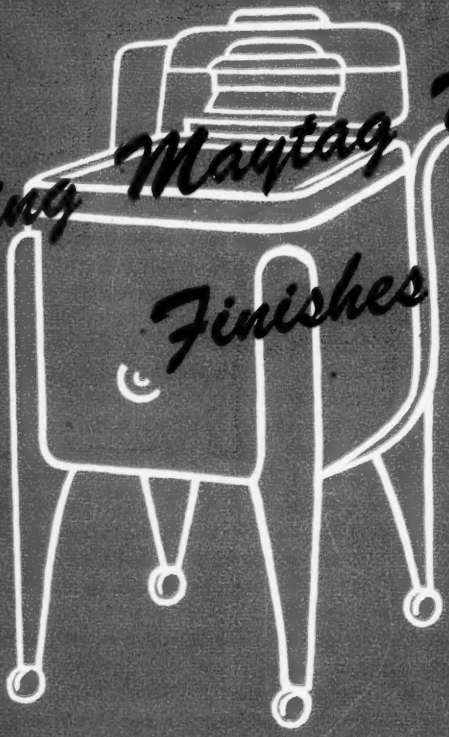
Despite the frequent emphasis on the importance of effecting every economy of material and labor in the finishing room, existing conditions in many plants are evidence that greater effort can and should be expended on this phase of the production process. While it is true that certain large industries have made notable progress, during the last decade, in systematized control of operations, many shops have yet to adopt proven methods that are unquestionably applicable to their procedure. It must be admitted that all of the possible controls available are not adaptable in every instance, but this fact should not be permitted to establish a policy of wholesale rejection of ideas.

Unfortunately, in some plants there seems to be a popular phantasy that the finisher's problems are so elementary that it is unnecessary to accord them the degree of study or analysis given other production departments. Undoubtedly, this has resulted in certain deficiencies of supervision and operation. One example is the lack of detailed knowledge of the equipment used for materials application. That this alone has been responsible for excessive costs, production delays, and poor finishes has been proved on various occasions.

The most logical time to establish sound finishing room policies is prior to the purchase and installation of equipment. Before the purchase of equipment for the finishing room, an analysis of the production requirements should be made. At this time, it should be decided what coating system will most adequately fulfill the demands for speed and quality, and how readily it may be adapted to the product and existing conditions. Obviously, no system completely satisfies every demand of production, economy, and quality. It is, therefore, advisable to determine the capabilities and limitations of each coating method.

Considerable study should be given to the location of a new finishing room to be sure that the location will be such that it will tie in properly with the other production departments. It should be so located that dust and dirt may be kept at a minimum, should actual air conditioning be impractical. The arrangement should be such that a logical sequence of operations may be carried on without interruptions or back-up operations. If the spray method is used, a room temperature suitable for the material sprayed should be maintained at all times of the year and, if possible, a method of humidity control should be devised. Proper consideration to these factors will pay dividends in economy and efficiency of operation of the finishing department.

Testing Maytag Washer Finishes



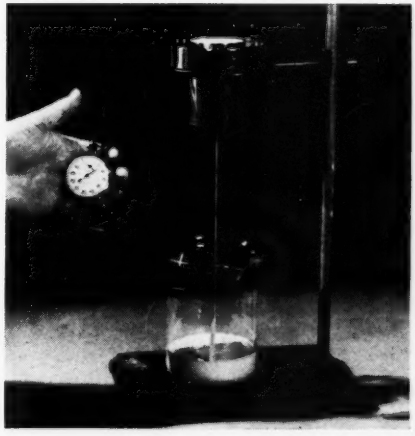
By Charles W. Jensen

Maytag washers are spray finished with a special paint that has been tested for maximum wearing qualities.

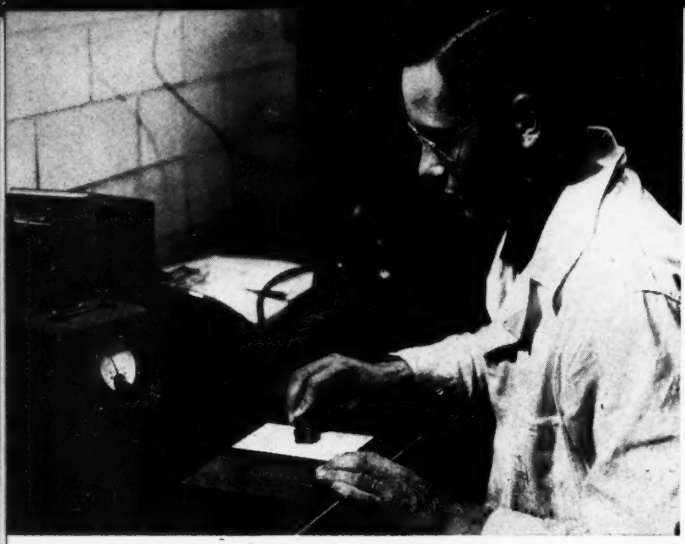
WHEN Maytag Washers strut in the fashion parade of appliances, showing off their beautiful ensembles of glossy white and red enamel, they have every reason to be proud because they are wearing a specially formulated dress made exclusively for Maytags. Chemists in the Research and Development Division of The Maytag Company are constantly testing and evaluating new finishes for their washers. Rigid standards have been adopted, all of which must be met before a new finish can be approved for wearing by the Maytag washer.

Twelve of the leading paint manufacturers in this country keep a steady flow of their samples coming into the Research and Development Division for analysis by Maytag research chemists. In this typical laboratory of test tubes, beakers, and gas jets, these many paint samples are subjected to many severe tests for practicability.

Testing of a new finish or finishes comprises a series of comparative tests in which the new paint is compared against the one being used in production at the time of the test. Each test is devised to simulate some extreme condition to which the finish on a Maytag washer might possibly be subjected. Test panels are prepared



This illustration shows the test for viscosity—resistance of the paint to motion of its particles.



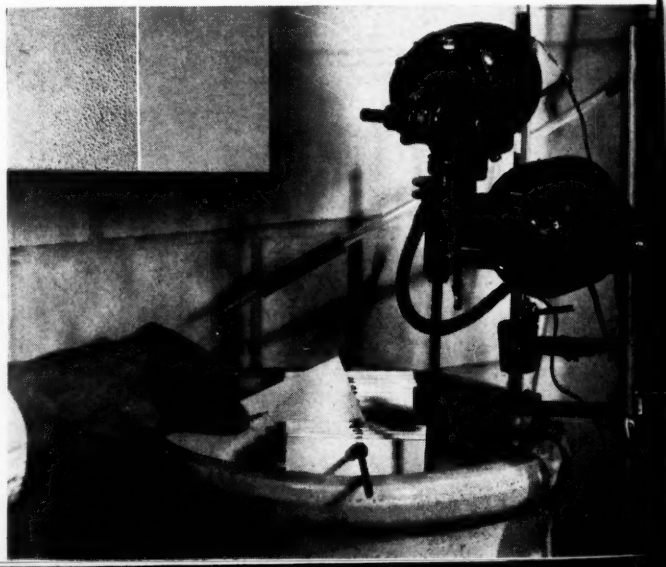
Bill De Jong, research chemist at The Maytag Company, is shown testing the thickness of a paint sample. The meter in the foreground indicates which part of the surface is too thin when the small plug is moved across the panel face.

for each paint along with panels of the standard material. Panels are of the same steel used in fabricating the Maytag washer and are four inches wide by six inches long. Before applying the different finishes, each panel is cleaned and rust-proofed on the production lines to reproduce actual painting conditions.

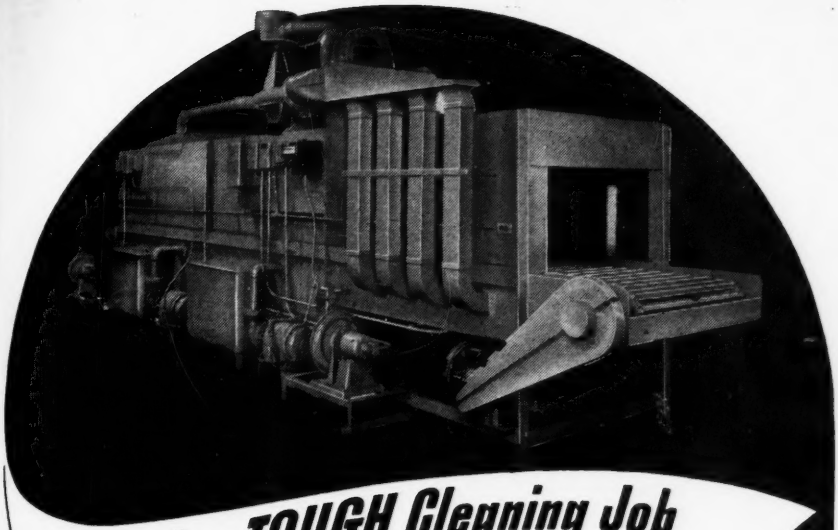
At application time each finishing material is checked for consistency, viscosity, and spraying characteristics. After application, the painted panels are baked under conditions specified by the manufacturer. Thickness of the paint film on each panel is then measured to eliminate any variables which might arise from such differences. Special curved panels of die-cast zinc are also painted with each finish for testing abrasion resistance.

Once a finish has been approved for use on Maytags it makes its appearance in the paint assembly of the factory where it is estimated that less than four minutes is required to paint one complete Maytag washer. More than 400 gallons of mixed paint are used daily exclusive of the red trim.

According to Bert Falkenburg, chief research chemist of The Maytag Company and responsible for the paint testing, most finishes break down



In the soap bath test, the paint panels are immersed in a standard soap and alkali bath at 165 degrees Fahrenheit for 48 hours. Inset: Appearance of paint panels after subjecting to soap bath test. The panel at the right has the finish accepted for use on Maytag appliances.



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Bert Falkenburg, chief research chemist at The Maytag Company, examines a paint panel on the abrasion machine. Inset: Paint panels after being subjected to abrasion test. Acceptable sample for use on Maytag products appears at the right.

when subjected to the soap bath. Panels are immersed in a standard soap and alkali bath at 165 degrees Fahrenheit for 48 hours. Each panel is checked periodically for hardness, discoloration, peeling, and blistering.

A unique machine tests the paint panels for abrasion resistance. A special apparatus has been constructed using a wringer from a Maytag washer. This device is equipped with a continuous canvas belt which passes over the special curved panels fitted on the wringer apron. By means of heavy rollers the moving belt exerts a constant pressure on each panel. In addition, the belt passes through a hot soap solution which constantly bathes each panel.

Humidity baths are also a vital part of the panel testings. Panels mentioned above are suspended in a cabinet maintained at 100 per cent humidity and at

Various samples of paint panels are lifted from the humidity bath by Bert Falkenburg. Inset: Samples as they appear after being given the humidity treatment at 125 degrees Fahrenheit. Unaffected sample on right is acceptable for use on Maytag products.

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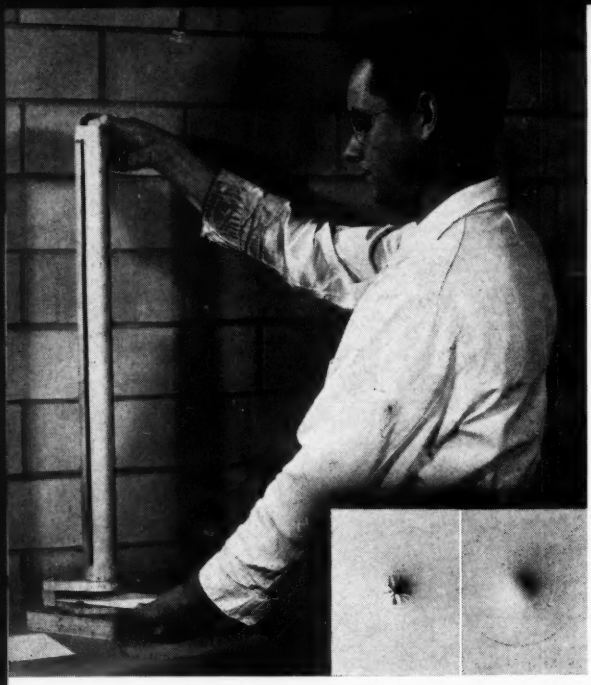

This illustration shows the impact test about to be made by Bill De Jong. The 2.2-pound weight drops 27⅛ inches on the paint panel, cracking inferior paint. Inset: Paint panels after being subjected to impact test. Acceptable sample used on Maytag appliances appears at the right.

125 degrees for 200 hours. These panels are checked for softening, blistering, and rust.

Samples of paint panels are subjected to grease staining. Small dabs of the various greases used in a Maytag washer are placed on the panels and aged for 200 hours at 158 degrees Fahrenheit. Any discoloration in the panels is noted.

Flexibility of the finish is determined by the "guillotine," a term applied to the impact machine which drops a 2.2-pound weight 27½ inches onto a paint panel. The weight makes an indentation three-eighths of an inch in radius.

Hardness of a finish is checked by means of an instrument known as a Hoffman Scratcher. The actual weight load necessary to cut or scratch into the finish is accurately measured. There are also other miscellaneous tests which the paint samples are subjected to before The Maytag Company will accept the finish your new washer wears.

Randolph Fire Extinguisher Data-Guide. A handy, compact, rigid data-guide presenting important facts regarding the suitability, maintenance, and performance of soda-acid, foam, pump tank, dry powder, loaded stream, carbon tetrachloride, and carbon dioxide fire extinguishers has been prepared by Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago 11, Ill. The reverse side of the guide indicates, in relation to particular plant fire hazards, the height units should be bracketed, maximum distances of the extinguishers from the operator, and the area protected by each unit.

Of particular value to safety, plant, and purchasing directors, as well as in employee fire-fighting instruction and fire schools, the data-guide is available free on request.

Hercules Products for Protective Coatings. The various Hercules products used in the manufacture of protective coatings are conveniently listed according to use in a four-page folder prepared by the Hercules Powder Co., Inc., Wilmington, Del. The products are listed under the various types of protective coatings in which they are used, together with brief descriptive matter explaining why a specific product is used for the indicated purpose.

Types of protective coatings listed include lacquers, oil varnishes, synthetic resin base varnishes, oil paints, bituminous and roof paints, marine paints, japans, ester gum varnishes, natural resin varnishes, cold-cut and spirit varnishes, interior and exterior water paints, and thinners. Copy of folder free.

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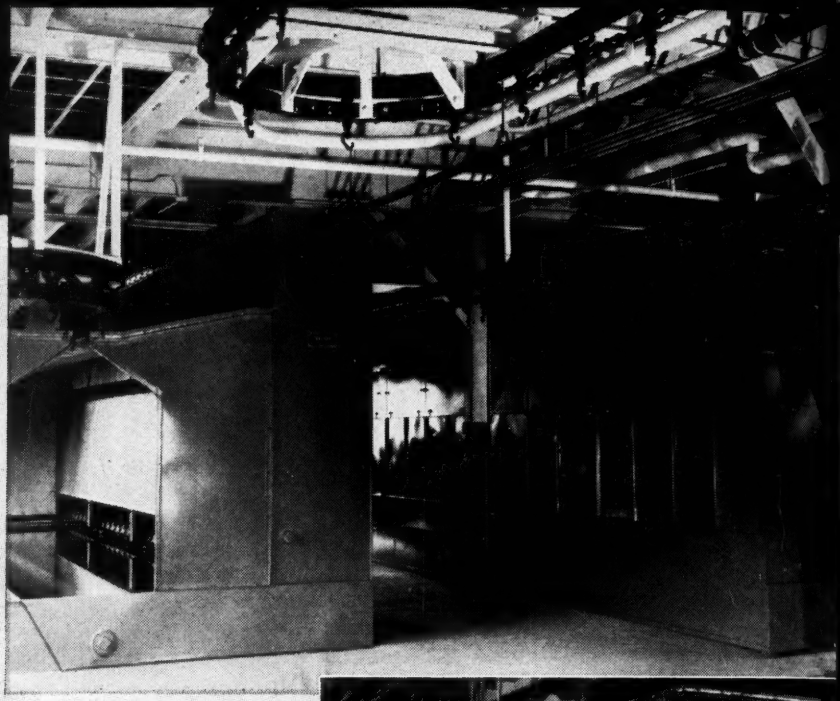

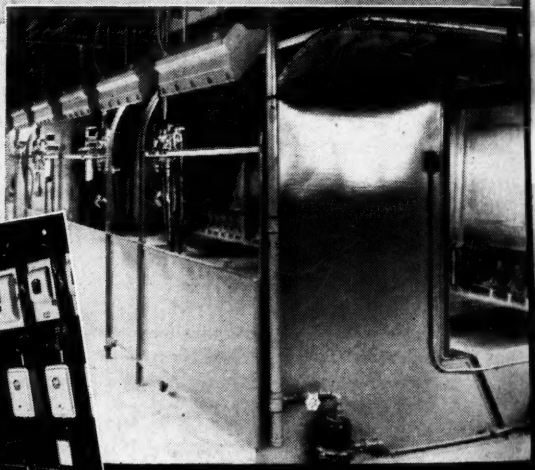

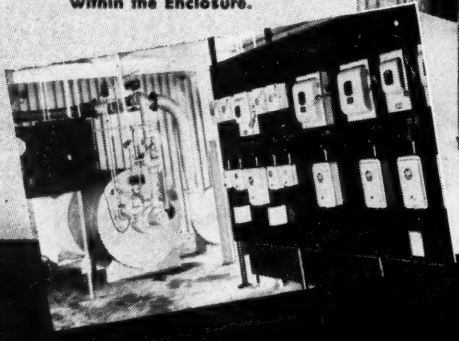

Above and at the Right are views of Mahon Hydro-Filter Spray Booths in the Enclosed Spray Room at the Morton Mfg. Co.'s Plant. This Spray Room is Supplied with Filtered Air maintained at a Slight Pressure within the Enclosure.

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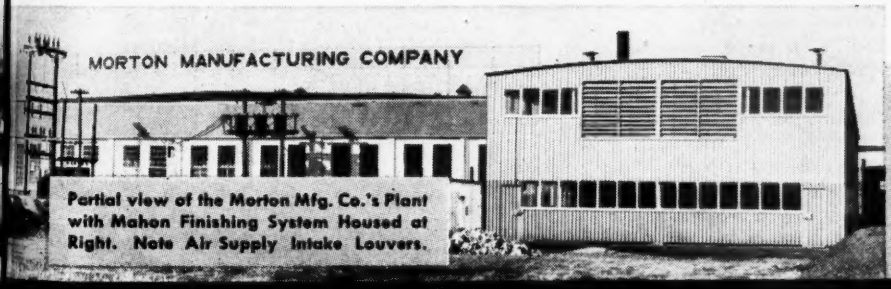


Partial view of the Morton Mfg. Co.'s Plant with Mahon Finishing System Housed at Right. Note Air Supply Intake Louvers.

MAHON

Tin Plating and Control of Tin Solution by Anode Color

The author presents an "instruction sheet" for the operation of a low-caustic, low-temperature tin plating solution.

By JOHN FRANKLIN DAYMUDE, Ch.E.

SINCE the first application of electrotinning almost one hundred years ago, electroplaters have devoted a considerable amount of time and energy in developing improved application and control methods for tin plating solutions. The present-day solutions and procedures give ample proof that the research has not been in vain, for each new development has brought the electroplater one step nearer to the accepted ultimate goal, namely, plating solutions characterized by simplicity of operation and ease of control.

The plating solution under consideration in this article is applicable to a wide variety of base metals and possesses excellent throwing power. The method of visually controlling the solution was developed primarily for the layman, consequently a technical education is not primarily necessary for the efficient control and operation of the plating bath. It is suggested that a thorough study of the visual control method be made and, if possible, memorization of the causes of trouble and the proper corrections be made. With most of the answers to tank troubles in mind, a great amount of time can be saved in correcting a plating solution at precisely the very moment in which any trouble occurs.

PLATING SOLUTIONS

For Still or Automatic Plating:

Sodium stannate	12-19 oz./gal.
Caustic soda	1-1.5 oz./gal.
Sodium acetate	2-2.5 oz./gal.
Hydrogen peroxide (100 vol.)	1/16-1/12 oz./gal.
or	
Sodium perborate	1/16-1/8 oz./gal.
Temperature	130-135°F.
Free caustic	1-1.6 oz./gal.
Amperage (cathode)	10-60 am./ft.^{2}
Voltage	6-8 volts
Anodes (pure straights tin or equivalent 99+%)	Bar or ball type
Tank (use double welds)	Steel
Anode—cathode distance, min. 11", max. 16"	This is average
Anode current density	10-20 amp./ft.
Sorghum molasses	1 gal./800 gal. sol.

(Add the molasses to new solution and as needed later.)

Barrel Plating:

Sodium stannate	19-21 oz./gal.
Caustic soda	2-3 oz./gal.
Sodium acetate	2.5-3 oz./gal.
Hydrogen peroxide or sodium perborate	1/16-1/8 oz./gal.
Temperature	135-140°F.
Free caustic	1.5-2 oz./gal.
Amperage, cathode	10-70 amp./ft.^{2}
Voltage	9-12 volts
Anodes (pure straights tin or equivalent)	Conforming type
Anode—cathode distance (as close as possible, use bent conforming anode)	
Anode current density	As low as posible
Sarghum molasses	1 gal./700 gal. sol.

(Add the molasses to new solution and as needed later.)

Before using any new tin solution for plating, the solution should be worked with anodes hanging on the cathode bar for 24 hours. In the case of barrel plating, light loads should be used and ¾ loads for hand tank plating for the first few days.

Building the Tin Solution. Add the sodium stannate, the sodium acetate, and ¾ of the total amount of caustic soda to the tank first and mix well before adding peroxide. Then bring the solution level up to within 1 inch of the working level, at which time the solution must be tested for free caustic before any more of the remaining caustic is added, so that corrections in the free caustic content may be made.

Don't Heat the Water for Mixing Chemicals over 140 Deg. F. After the free caustic has been checked and corrected, add the peroxide and heat the plating solution to 135 deg. F. Place deadheads (anodes) on the cathode rods and start plating on the deadheads for an hour or so to see how the solution acts and if the anodes come up to color (see control by anode color).

After the solution has been worked for several hours, a complete chemical analysis should be made for free caustic and sodium stannate. **Note:** It may be advisable to hold the stannate constant between 18-18:5 oz. per gallon for the first few days until the solution has had time to be worked up by plating.

Additions of Peroxide or Perborate. Peroxide or perborate will have to be added several times per day when the solution is being worked. It is suggested that peroxide be used at all times.

A good way to control the additions of the peroxide is to watch the plating solution and see that enough peroxide is in the plating tank to keep at least ⅛ to ¼ inch of foam on the solution while the tank is being used for plating.

In adding small amounts of peroxide, dilute the peroxide 1-1 with water. For large amounts of peroxide, the full strength can be used. In any case the **peroxide should be added back of the anodes** rather than into the center of the tank. Try to distribute the peroxide throughout the tank rather than in any one place.

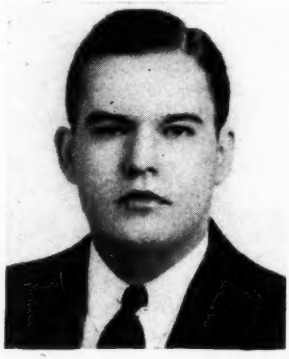
Control of Solution by Anode Color. When a tin plating bath is operating properly, oxygen is given off at the anode. When this condition exists, any stannous tin present in and around the anodes is oxidized to stannic tin which is necessary and desirable.

If the proper amount of oxygen is not given off at the anode, the tin will dissolve in the stannous form, causing the plating to grow whiskers and a spongy deposit of tin. The solution will start to turn dark to black, and all of

the work in the plating tank will have to be stripped or, if the shape allows, it may be scratchbrushed or sanded and then replated.

Correct solution color is light gray to straw color.

Dark Solution. If the solution darkens and if the darkening of the solution is noticed in time, the following doctoring may correct the condition without the loss of time and plated work. When the darkening of the solution is first noticed, take out or look at some of the work being plated. If the work looks normal, with no whiskers or spongy deposit, **add at once 1 qt. of 100 vol. peroxide for every 300 gallon of plating solution, around the anodes and back of the anodes** while agitating the solution as much as possible without stirring up the bottom of the plating tank. Watch the solution color and if the dark color p e r s i s t s, raise the temperature 5-10 deg. F., and increase the current density of the plating solution 5-10 amperes per square foot.



JOHN F. DAYMUDE

By adding 100 vol. peroxide every few minutes, the tin can be kept in the stannic state and plating could be continued if there is thought to be a chance to find out what is causing the trouble. The peroxide will not harm the plating solution. The foam will trap hydogren gas which in turn will explode if there is any sparking from the plating racks. While these explosions are noisy, no harm will come from them unless some of the plating solution is blown on the operator.

Some causes of the stannous tin formation are too low anode current density, too high caustic content, plating shorts either in the tank or racks, **anode to cathode ratio too low** (add more anodes), and **too low metal content.** Anodes are a golden to yellowish-green color if the tank is in good working order for most concentrations of metal and caustic at a working temperature of 130-135 deg. F.

If the anodes are dark on the bottom and carry the normal color toward the top, the anode current density is too high. Add more anodes or lower the current density until more anodes can be added. If the anodes remain clear with a metallic gray color, the caustic soda is too high or the anode current density is too low. Check free caustic content.

If the anodes become scaled and covered with a black hard deposit and the current falls, the caustic content is too low. Check free caustic content (too high C.D. for solution).

If the anodes have a black soft coating, the trouble may be too high concentration of metal for the current density of the tank, such as a slight load of work against what you have been plating (load of work meaning plating area). A metallic gray color is also developed in a too high solution temperature.

Shorts either in the work or the tank can cause all the conditions mentioned above.

One other method of clearing up a plating solution that has the 2 and 4 valent tin in solution (black colored solution) is: Add the peroxide to keep the solution in operation, and then add approx. 1 gallon of glacial acetic acid per 1,000 gal. along the anodes while stirring the top of the solution where the curds are broken up, add at the

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rear of the anodes 1 qt. of 100 vol. peroxide per 300 gallons of solution, and increase the current density 5 amp. Allow this condition to remain until the stannate and free caustic can be checked. After the analysis, proper corrections may be made as will be described later in this paper. What may seem inconsistent is that the analysis may cause you to add back the caustic that was neutralized by the addition of the acetic acid, but you will find that the plating solution will be working OK from then on for days or weeks without further trouble. This method of correction actually operates only when the solution is slightly out of balance, the cause of which is difficult to detect when trouble develops while plating. (If the free caustic content is high, take care not to add too much peroxide.)

In any case, this treatment could be used in all or most cases where black anodes go hand in hand with a troublesome plating solution without any harm of any kind to what the final correction may be.

As you see, the bath can be controlled by anode color and controlled over long periods of time if the operator or the control man will take a little time to learn what to look for on the anode and remember the proper corrections. In any case, as noted above, the plating in the tank and even the solution itself may be saved when the plating solution starts to go bad if **the operator can think to use peroxide at once when trouble starts** and continue to use it for an hour or so until the trouble is eliminated.

The operator or control man should be trained to use his eyes in the color of the plating solution and the anodes and taught what the proper corrections are before anything happens rather than to get out his handbook or

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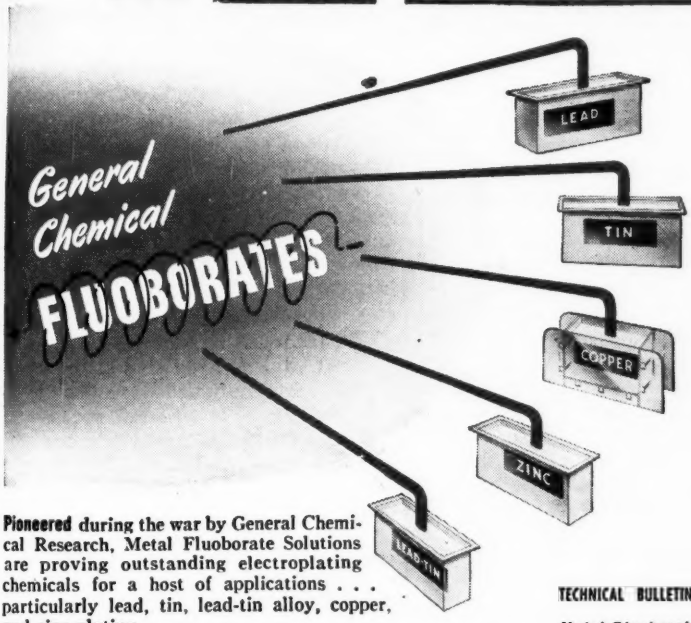

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technical paper on the subject after the trouble develops.

Voltage. The still tank should be used with 6-8 volts, and the barrel tank with 9-12 volts. If insufficient amperage is obtained at these voltages, the caustic soda content may be increased slightly, providing the anode surface is increased to the proper ratio to control anode color and burning.

Anode—Cathode Ratio. The anode to cathode ratio should be at least 2-1 greater if the anode color can be obtained without trouble in hand and automatic plating and as many anodes as possible should be added to barrel plating tanks.

Anode—Cathode Distance. The anode-cathode distance in still and automatic tank plating should be about 13 inches for standard work, and greater if the work is greatly recessed. (If the work is too greatly recessed, inside anodes will have to be used.)

In barrel plating, the anodes should be of the conforming type (curved to the barrel contour) and placed about 3 inches from the barrel in order to obtain the maximum throwing power. Care must be taken in the placing of anodes too close to the barrel otherwise burning will develop or anode color cannot be detected.

Making Additions of Metal to Plating Tank While Plating Is in Progress. The following method of adding metal to plating tank while plating is in progress is one that will cause no trouble such as rough work, and so on. Take the amount of sodium stannate to be added and dissolve in the least amount of 170-180 deg. F. water possible by stirring. Allow the solution to settle for about 5 minutes and add ½ gal. of 100 vol. peroxide for every 35-40 gal. of this mixture. Stir lightly so as not to disturb any undissolved stannate and allow to settle for 2-3 minutes. The appearance at this stage is a very foamy liquid. If not foamy,

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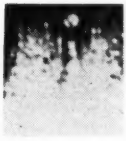
After three minutes in Houghto-Clean "200" Heavy Duty cleaner the plate photographs clear black, which means absence of soil.



U.V. light photo shows unclean surface after 3 minutes in bath of old-type heavy-duty cleaner. It took 15 minutes to make plate "come clean."

*Ultra-violet light was used to evaluate these new cleaners. Residues remaining on metal plates after various timed periods of cleaning glow with fluorescence, revealing what daylight vision cannot detect.

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add more peroxide, approximately another ½ gal., and again stir lightly. Allow to settle for another 2-3 minutes and then transfer the liquid (foamy liquid) to the plating solution in such a manner as not to allow any of the undissolved stannate to enter the plating solution.

Never dip the foamy mixture of stannate and peroxide into the plating tank as it is impossible to do so without stirring up the bottom of the mixing tank. Use either a pump with the suction hose several inches off or above any of the undissolved stannate, or, if the mixing is done in a bucket, pour the liquid off, being **very careful** not to transfer undissolved stannate to the plating tank. If no undissolved stannate is added to the plating tank, there will be no bad or rough deposit of plating.

COLOR AND APPEARANCE OF THE PLATED SURFACE AND SUGGESTED CORRECTIONS

Dark Gray Metallic Appearance. The temperature of the solution is low.

White Metallic Appearance. The temperature of solution is high.

Spangled Appearance. Add molasses, increase metal content, raise temperature 5 deg. F., and increase current density if possible.

Burned Edges. The current density is too high for the solution analysis or the work is too close to the anodes. Adding more anodes sometimes will correct the trouble as it reduces the anode current density.

Paneling. The work is too close together. Increase the cathode spacing.

Uneven Appearance of the Plated Piece. Poor racking and improper current density. Check analysis. Molasses addition may help.

Blisters. Improper cleaning. Cleaning solution may be either too strong or not strong enough or out of balance. Cleaner may have to be redesigned for the type of work or base metal being plated.

Bare Spots. Grease, oxides, and rosin from an improper type of cleaner and burning are present.

Soft Tin Plate. Add 0.1 oz./gal. of tin crystals (tin chloride) and ⅛ oz./gal. of sodium perborate instead of peroxide.

Hard Tin Plate. Increase the caustic content or cut the caustic content. Cut the caustic with 1 gal. of acetic acid per 800 gal. of plating solution and plate for 4 hours, then re-add all the caustic neutralized by the acetic acid plus 0.05 oz./gal. more caustic addition.

Peeling of the Plate. Improper cleaning and pickling or poor contact as the work is first placed in the plating solution. Remember this stannate type of plating solution has a fairly high caustic content. On zinc and its alloys, poor initial contact will cause peeling and blistering and can also cause the work to be either stripped completely in the case of zinc plate or etched so badly in the case of die cast-

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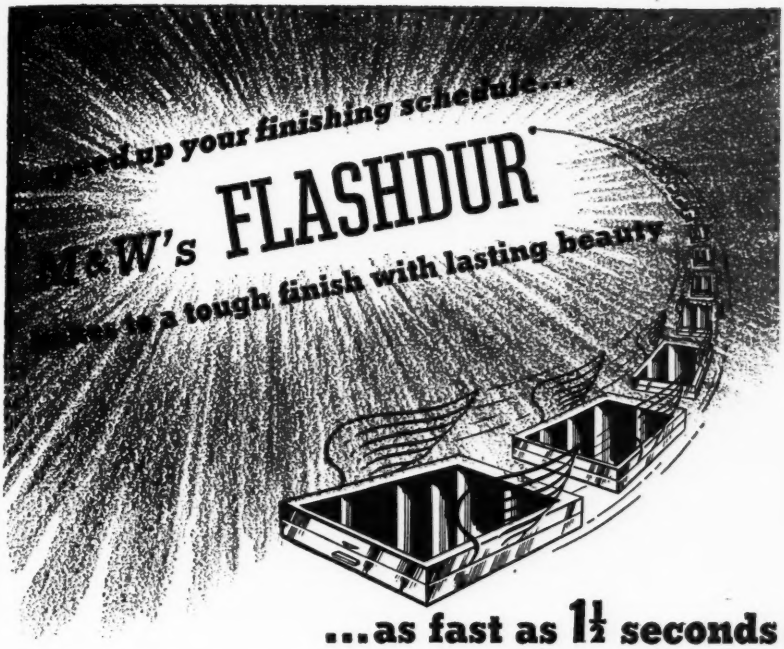

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ings as to ruin the part as well as contaminate the plating solution.

Etching and Soft Alloy Blisters. Poor initial contact to the cathode bar and over cleaning.

CLEANERS

Use well designed cleaners for the type of work being plated. In some cases, standard cleaners can be improved by the addition of from ½ to 1 oz./gal. of sodium cyanide and 1½ oz./gal. of trisodium phosphate, especially in the case of cleaning zinc and its alloys and copper and its alloys and several other base metals. Be sure not to over clean the article being plated so that it becomes oxidized.

A good after pickle cleaner, especially for ferrous metals, is:

Sodium cyanide ------6-8 oz./gal.
Caustic soda ---------1 oz./gal.
Trisodium phosphate --2-2½ oz./gal.
Orvus ----------½ oz./gal.
Temperature ---------120-150° F.
Time ----------20-40 sec.

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Current density ------5-40 amp./ft.²
(For non-ferrous metal, use as a soak cleaner 1 to 10 minutes.)

REPLATING TINPLATE

In replating tinplate, clean well in a mild cleaner using cyanide and TSP as noted under cleaners. Where possible, start the plating with a high current density for 30 seconds and then plate at the standard current density for the type plating solution you are using.

Wiring the Tin Tank. The positive and negative line contacts should be so spaced that in a long tank (over 8 feet) a line from each pole is placed at both ends of the tank. Where the tank is extra long, feed current in from several spots about 8 feet apart. Be sure the feed lines are of sufficient size to take care of an overload of current. Wiring of this type will give an even distribution of current and thus help the plater do a better job.

Plating Thickness for Protection:

Base Metal	Thickness of Plate
Steel	0.0008″ Min.
Porous steel, cast iron	0.0012″ Min.
Galvanized steel	0.00075″ Min.
Copper and its alloys	0.0005″ Min.
Zinc die castings	0.0008″ Min.

A light tin plate on copper and its alloys will cause poor soldering and show copper stains in a short time because of the migration of copper through the plate This condition is accelerated by humidity.

Current Density vs. Plate Thickness:
25 amp./ft.² will deposit 0.000025 inch metal in 1 minute.
25 amp./ft.² will deposit 0.00025 inch metal in 10 minutes.

Stock Solution:
Sodium stannate ---------32 oz./gal.
Caustic soda ----------¼ oz./gal.
Sodium acetate ----------¼ oz./gal.

Add peroxide just before the addition of the metal mix to the plating solution.

in acrobatics it's balance

In metal cleaning, too, *balanced cleaners* are required.

The balanced composition of Wyandotte Metal Cleaners*gives long life to solutions and permits lower concentrations, so that cleaning is economical. This balance makes Wyandotte Compounds clean faster and more efficiently, resulting in economy through increased production and fewer rejects.

You get diversified applications from Wyandotte Metal Cleaners because of balanced formulas. They contain ingredients for water conditioning, saponifying, emulsifying, wetting action—plus the ingredients for a long pull. They give better rinsability.

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FIGURING TIN PLATING COSTS

Metal	Val.	Thickness for One Sq. Ft. of Plating 1	Grams Per Sq. Ft. of Plate in Column 1 2	Grams of Metal Deposited in One Amp. Hr. 3	(Tin @ 68c/lb.) Cost of One Gram of Metal 4
Tin(ic)	4	0.0001"	1.73	1.00	$ .0015

Actual Amp. Hr. to Deposit the Metal Thickness in Col. 1 5	Metal and Current Cost per One Amp. Hr. 6	Overhead: (Gen. Losses Figured at 20%) 7	Total Cost Per Amp. Hr. Per Col. 6 and 7 8	Std. Cost for Plating Thickness in Col. 1 9
1.73	$ .0025	$.0005	$ .003	$. 0052

ANALYSIS OF THE PLATING SOLUTION

Metal As Sodium Stannate:

1. Place a 5 c.c. sample of the plating solution in a 250 c.c. beaker, add approximately 125 c.c. of distilled water and bring to a boiling temperature and remove from source of heat.

2. To this hot solution add 11 to13 c.c. of 10 per cent acetic acid solution and stir for 30 sec.

3. Allow the PPT to settle 3 to 5 minutes and filter, while hot, through No. 42 Whatman filter paper (using a platinum filter cone and suction flask, 500 c.c.).

4. Wash PPT several times with hot distilled water and after the last washing allow the PPT to stay on the filter paper until the PPT cracks from dryness (about 20 min.). **Note:** The next operation may be followed in 10 min. with care.

5. Transfer the PPT and filter paper to a No. 0 or No. 1 Coor crucible, folding the edges of the filter paper into the center to make a small pack. Use care so that none of the PPT is lost.

6. Apply heat slowly to the crucible and sample until the paper is nearly burnt off and then more strongly until the paper is completely burnt off. Then continue heating (red heat) the crucible for 10 min. or more.

7. While still heating crucible add powdered NaCN C.P. until the oxide in the crucible is covered by liquid cyanide. **Note:** Don't allow the liquid cyanide in the crucible to become too low or tin will be lost.

8. Continue heating the crucible (blasting) until all tin that has formed small balls forms one large ball. Add powdered NaCN along the sides of the crucible during the blasting and after the large ball of tin has formed to wash the tin down from the side of the crucible.

9. After the ball (large) of tin is formed, cool the crucible and leach out the tin in boiling water. Then wash the tin that is in the beaker from the leaching operation carefully with water and then in alcohol. **Note:** There may be some very small pieces of tin besides the large ball of tin. If so, these must be carefully kept with the large ball of tin.

10. Weigh all the metallic tin from operation No. 9 and calculate as follows: grams of metallic tin x 48.1 (when using a 5 c.c. sample) = oz./gal. of sodium stannate.

With a little care, this method is accurate and can be very fast after a few tests have been run.

HYDROMETER TESTING OF STANNATE CONTENT OF A STANNATE TIN SOLUTION

By using a 60/60 deg. hydrometer for heavy liquids, an accuracy of from ¼ to ½ oz. per gal. of sodium stannate can be achieved. To develop the method, know the metal, free caustic and temperature of the solution, and

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then place the hydrometer in the plating solution and record the Bé. reading. Now with the temperature and free caustic content constant for all tests, run a series of hydrometer tests at the same time as the metal is tested chemically until your readings cover enough varied stannate concentrations to control the plating.

Note: For every type of tin plating solution (stannate), a new set of hydrometer readings must be made. Also, you will notice the hydrometer readings increase for the metal concentration as the solution becomes older. This change is very slow but in time the readings must be changed.

Always take the hydrometer readings after the free caustic and temperature are adjusted correctly. Also, every time you analyze the tin solution for metal chemically, check with your hydrometer.

Greater accuracy can be obtained with a special hydrometer that has been calibrated at the temperature at which you operate your tin plating bath. This is more economical than testing the stannate each time chemically.

To determine free caustic in the stannate plating solution:

1. Place a 5 c.c. sample of the plating solution in a 200 to 250 c.c. beaker, add approximately 75 c.c. of distilled water and 25 c.c. of 10 per cent $BaCl_2$ solution.

2. Add 10 drops of thymolphthalein indicator solution and titrate with .231 N HCl until the blue color just fades. (In a high stannate plating solution, add 35 c.c. of the 10 per cent $BaCl_2$ solution.)

3. Calc.: c.c. of the HCl .231 N used $\div 4 =$ oz./gal. of free caustic.

Example: 5.6 c.c. HCl used in the titration, therefore, $5.6 \div 4 = 1.4$ oz./gal. free caustic in solution.

FILTERING

When the sludge and dirt become objectionable in the bottom of the plating tank or suspension, the following procedure will be found advantageous. At a time when the tank can be down for at least 24 hours, heat the solution to 160 deg. F., add ⅛ oz./gal. of sodium perborate and stir up the material in the bottom of the plating solution. (In this manner, stannate and other chemicals may be saved that otherwise would be filtered out.) Let the solution settle for several hours and filter the plating solution, using filter aid. After filtering out all but the sludge in the tank, pump the sludge into the sewer, clean the tank, and pump the filtered plating solution back into the plating tank. Analyze the solution and bring up to normal. In most cases, the metal content will be high, and, if possible, use the solution without changing the metal content as metal plates out very fast.

The additional time required in this method of cleaning the plating solution and tank will more than pay for itself in metal saved.

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Finishing Clinic

Choosing a Cleaner for Zinc Base Die Castings

MOST production men in the finishing industry are fully cognizant of the fact that satisfactory service cannot be expected of any coating applied to zinc base die castings unless the metal surface on which it is applied is thoroughly cleaned. Simple electrolytic alkaline cleaning is not entirely satisfactory for zinc alloy die castings prior to plating because of the ever-present danger of overcleaning some areas while removing heavier grease films from other areas. Frequently, the heat developed in buffing, particularly in automatic setups, will cake the compound trapped in recesses into a hard mass which must be softened by other means before electrolytic cleaning can be effective. Some form of solvent cleaning is desirable as a preliminary step in the cleaning cycle. Trichlorethylene is widely used for this purpose. Oftentimes, the use of certain water emulsion type cleaners may be helpful in softening heavy and caked grease films.

Most solvent cleaning methods depend upon solution of the grease and oil by simple washing or immersion in a solvent. In such cases, the last trace of solvent to evaporate from the surface leaves the metal coated with a thin film of grease. Vapor cleaning or vapor rinsing in the comercial systems using trichlorethylene will overcome this undesirable occurrence.

The selection of an **alkaline cleaning** cycle will depend to a considerable extent upon the type of equipment available. However, the selection of the cleaning compound should be

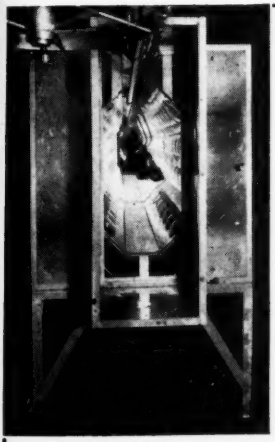
carefully done from the functional standpoint, as it has definitely been established that the formation of blisters in copper deposits on zinc die castings can result from excessive alkaline cleaning ("The Monthly Review," May, 1940). A number of proprietory cleaners on the market are designed specifically for cleaning zinc alloy die castings. A simple non-proprietory cleaner, consisting of a solution of 4 to 6 oz./gal. of trisodium phosphate, has been recommended by The New Jersey Zinc Company. This suggested cleaner is operated as a cathodic electrocleaner at a temperature of about 180 deg. Fahrenheit.

In a study to develop suitable cleaner recommendations prior to copper plating for zinc die castings that were subsequently to be heated in lacquering operations, F. F. Oplinger recommended cathodic cleaning, following solvent vapor degreasing, in the following solution ("Tran. Am. Electroplaters' Society," 1940):

Trisodium phosphate	0.5-1.0 oz./gal.
Soda ash	1.0-2.0 oz./gal.
Temperature	160-180° F.
E.M.F.	6 volts
Time	30 sec. to 2 min.

Also, according to Oplinger, strong alkaline cleaners, for example 6 oz./gal. trisodium phosphate, can be used if the time of cleaning is limited to 10 to 20 seconds. However, such a time cycle cannot always be used in conveyor units; thus, the advantages of a lower concentration cleaner in which the cycle can be varied are evident.

According to Fred Hazel and William Stericker of the University of Pennsylvania and the Philadelphia Quartz Company in a report in the April issue of "The Monthly Review," there has been considerable disagreement in the past years as to whether zinc die castings should be cleaned with sodium silicates or even with compounds containing them. Some



● Finishing system installed at Eureka Vacuum Company, Detroit, Michigan, for first and second coat enamel bake of aluminum cast parts for vacuum cleaners. The Infra-Red oven shown above bakes the prime coat. A Swenson "Simplex" trolley conveyor carries castings through the various stages of the operation, extending through three floors of the building.

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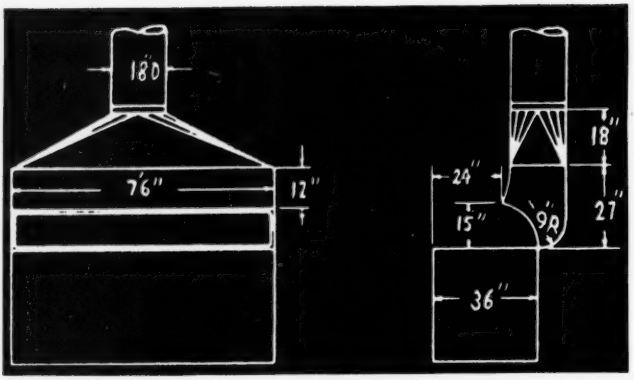

Fig. 1 — Drawing of hood useful for performing bright dip operations: exhaust volume, 175 c.f.m./sq. ft. surface area of tank; control velocity, 100 ft./min. at front of tank
(*Illustration courtesy "The Monthly Review"*)

platers reported good results while others refused to use any silicates in their cleaning baths. Thus, it appeared that there might be conditions under which difficulty would be experienced and others under which good results would be obtained. The results of a study carried out to clarify this point brought out the fact that at 195 deg. F. and a current density of approximately 1 ampere per square decimeter, zinc die castings can be satisfactorily anodically cleaned in a solution of 3 per cent sodium metasilicate or sesquisilicate. Under the same conditions the sodium disilicates and tri-silicates give a heavy white coating on the parts being cleaned. It was reported that there was no attack on the zinc die castings with the silicates alone under the above conditions. It was further reported that trisodium phosphate, tetrasodium pyrophosphate, and sodium metaphosphate are satisfactory for **cathodic** cleaning under the above concentrations and conditions.

Based on recommendations of The New Jersey Zinc Company, it is not possible to give definite preferred cleaning times for zinc die castings using proprietory cleaners since this factor will vary with the type and amount of grease, the type and concentration of the cleaner, and so on. Certain general statements may be made however. Relatively strong alkaline cleaners should not be operated cathodically with strong evolution of gas for time intervals exceeding 15 seconds. For conveyor operation when the work has been completely degreased, simple immersion cleaning is often sufficient. It is necessary that the production engineer work out the permissible time for his operation by test. In doing this, care should be taken to avoid developing a practice which permits serious overcleaning. Overcleaning is not always detectable by a change in surface appearance. As a general rule, if good adherence is not obtained in a reasonable cleaning time, the cleaner is at fault and extension of this time will only aggravate the trouble.

Acid dips are very important in the proper preparation of the zinc surfaces for plating, and requirements for acid dips vary as in the case of alkaline cleaning practices with the operating conditions encountered. Thus, an acid concentration and immersion time suitable for hand dipping operations may be far too drastic for a conveyor operation. Solutions of hydrochloric acid or sulfuric acid in concentrations ranging from 5 to 10 per cent have been used. However, there is good evidence that the reduction in intensity of alkaline cleaning needed to avoid copper blistering should be accompanied by a reduction in the acidity of the

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acid dip. With cleaners consisting of 4 to 6 oz./gal. trisodiumphosphate, sulfuric acid dips should be avoided. According to recommendations of The New Jersey Zinc Company, hydrochloric acid used in volume percentages of 1 to 3 per cent is satisfactory for most acid dip applications.

In hand operations where the dipping time can be controlled, immersion time of the order of five seconds or less are commonly used. One practice that is generally regarded as safe for the production man to follow is to immerse the work until evolution of gas bubbles just starts. This will ensure that the alkaline salts on the metal surface are neutralized as removed. On automatic conveyor operations, the operators must adjust the acid concentrations so that copious gas evolution and visible discolorations of the surface are avoided. Very inferior adhesion of plated coatings will result from failure to use an acid dip; however, at the same time poor results will be obtained from excessive acid dipping.

In general, the cleaning procedures described for zinc die castings prior to electroplating are suitable for use in an **organic finishing** cycle. Where chemical pretreatment is used, the work must be cleaned if uniform attack by the pretreating solution is to be produced. Many finishes suitable for application to pretreated metal surfaces are available. These will usually be found to possess satisfactory adhesion and retention of adhesion on properly pretreated zinc surfaces.

* * *

Film Thickness Is Important in High Quality Organic Finishing

FINISHING engineers concerned with quality control of product realize that film thickness is an important consideration in high-quality finishing. In many cases the protection afforded by a finishing system is directly proportional to the film thickness. Too thin a film will not meet the required standards of protection or appearance, while too thick a film is wasteful.

In testing film forming materials by either the absolute or comparative method, it is essential that a predetermined wet or dry film thickness is obtained. Also, if the drying properties of a finish are to be tested against a standard by the comparative method, the importance of having both films equal in thickness must be fully recognized if the test is to have any meaning. Thus, a thick film of the material being studied may require a longer drying time than a thin film of the standard when actually the test material may dry faster than the standard at equal film thicknesses. The Parks Film-O-Graph is a useful instrument for wet film thickness measurement. The Pfund gage affords a simple and accurate method for testing the wet film thickness of coatings

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in production, in view of the fact that it makes only a small mark which may easily be brushed out with a soft brush after the measurement is made.

Dry film thickness is different from wet film thickness, since it depends on the non-volatile content and the density of the finishing material. Thus, two materials of different non-volatile contents will not give the same dry film thicknesses even if the wet film thicknesses are equal. A sensitive micrometer is fairly accurate for measuring dry film thicknesses. The total thickness of dry film and substrate is first measured at a given point. Then, the film is carefully removed with solvents or with scrapping at that point, following which the thickness of the substrate is then measured at that spot and the film thickness determined by difference. A number of electrical devices as well as certain magnetic instruments are available for providing non-destructive test methods for measuring dry film thickness. These types of instruments are particularly useful for testing the dry film thickness of finished products in production.

* * *

Bright Dipping Solutions Require Effective Hooding

BRIGHT dipping as used in the finishing industry may be defined as a corrosion process whereby the percentage of specular reflectance from a metallic surface is increased without the application of an outside electromotive force. Copper, bronze, and brass are bright dipped in a widely used nitric and sulfuric acid mixture, which usually contains a small amount of hydrochloric acid. This is a very corrosive mixture and during operation brown nitrogen oxide gases (so-called nitrous fumes) are evolved. Since these vapors are very corrosive as well as toxic, bright dip baths require efficient hooding and exhaust.

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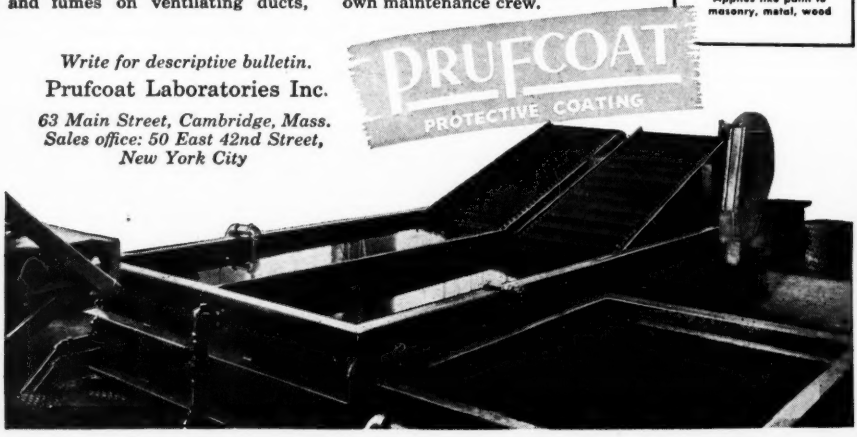

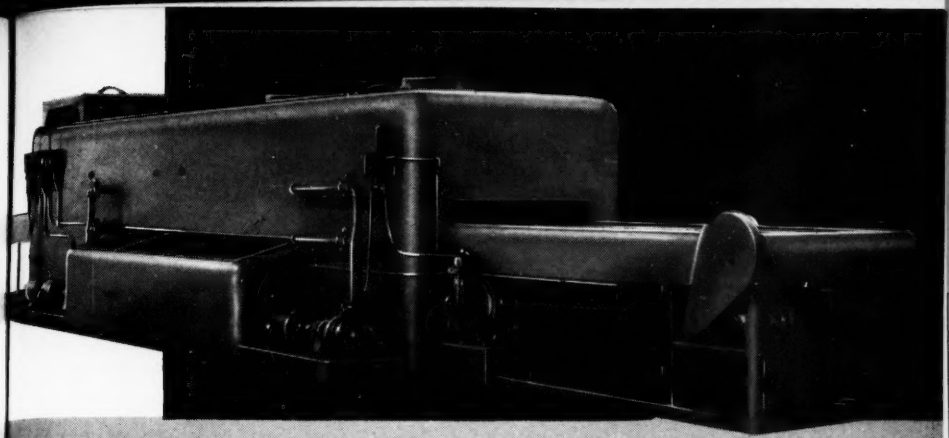

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The operation of dipping the metallic parts into the bath may be conveyorized but is ordinarily done by hand; as a result, the extremely corrosive bath is frequently contained in a large crock.

F. A. Patty, industrial hygiene consultant of the General Motors Research Laboratories, in a lecture on "Environmental Controls for Industrial Processes" given before the School of Public Health at the University of Michigan brought out the fact that ordinary canopy hoods are not satisfactory for bright dip solutions. Hoods considered effective for such a system must be aranged so as to direct the gases away from the operator's face and prevent him from even momentarily inhaling the concentrated gaseous fumes. Where hooded enclosures are used, arrangements should be such as to make it unnecessary and inconvenient for the operator to place his face within the enclosure. Exhaust ports on the side opposite the operator are perhaps most successful and convenient. Where an adequate volume is exhausted in this manner, baffles or shields may be dispensed with so as to provide unrestricted freedom of operation.

A satisfactory exhaust system, according to Patty, is shown in Fig. 1. The extraordinarily wide exhaust slot (over 15 inches) on this hood, though it may not provide for perfect distribution of air flow, affords good air flow where it is most needed; that is, above the center of the bath. A cluster of copper tubes approximately 12 by 18 inches in diameter were treated in the bright dipping solution, and several tests made in the operator's breathing zone by a method sensitive to two parts per million on nitrogen oxides produced negative results.

* * *

Specifications Are Essential to Electroplating Finishing Operations

IN discussing the functions of specifications for electroplated coatings before the Second Annual Symposium on "Modern Metal Protection" at Cleveland, C. E. Heussner and Carl O. Durbin of the Chrysler Corporation stated that a modern specification is a guide to providing exactly the kind of plated coating desired with the least effort and with certainty that the plating fits the needs. Usually, modern specifications are written for minimum requirements esential to give the desired performance at the lowest cost. They are a means by which much confusion has been eliminated between the plater and the user.

Zinc plating is specified by the Chrysler Corporation where protection against corrosion is the chief factor. Such coatings may be furnished in two classes differing chiefly in the thickness of the coating. **Class A** coatings are used for direct exposure to outside

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weather conditions and for parts which experience has shown require similar protection; specifications call for a minimum thickness of 0.0005 inch of zinc plate on the significant surfaces. **Class B** coatings are used for the protection of parts not exposed directly to outside weather conditions; specifications require a minimum thickness of 0.00015 inch of zinc plate on the significant surfaces.

Additional requirements are that **Class A** zinc coatings show no appearance of rust in 100 hours of salt spray testing and that **Class B** zinc coatings show satisfactory resistance for 50 hours of salt spray testing. The salt spray test for ferrous parts is conducted with a 20 per cent solution of sodium chloride (sp. gr. 1.15) under conditions that produce a dense fog throughout the container without the spray being blown directly against the specimens. The specimens are supported by glass or other insulating material with the significant surfaces at an angle of 15 deg. from the vertical. The temperature in the box is maintained, by thermostatic control, at 95 deg. plus 2 deg. F. or minus 3 deg. F. This is about the lowest temperature that can be maintained throughout the year without artificial cooling. The solution formed by condensation of the spray should be drained off and not used again. Certain other general requirements with reference to appearance, defects in coating, adherence and ductility, and absence of plating salt residues must also be met by all zinc plated parts.

Spring steel and other ferrous parts which are exposed to extreme service conditions are processed in accordance with the latest methods employed in producing a **chromium plate** for decorative purposes using either a nickel or copper-nickel undercoat. The specifi-

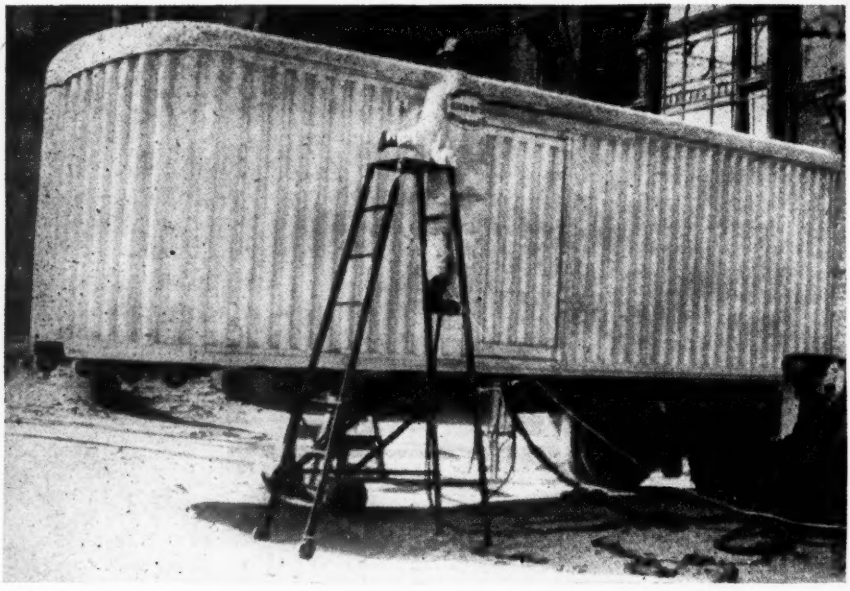
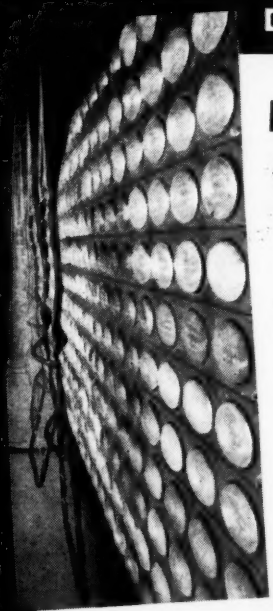


Fig. 2—Refrigerator trailer being sprayed with zinc after fabrication
(Illustration courtesy Metallizing Engineering Co., Inc.)



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cations call for nickel plating of parts from a standard Watts bath to a minimum depth of 0.0015 inch after buffing. Suppliers desiring to use a copper plate prior to the nickel plating may do so, provided the minimum depth of the exterior nickel is 0.0006 inch after buffing. Also, the minimum combined depth of the copper and nickel specified for the finished parts is not to be less than 0.0015 inch after buffing. Following the application of these undercoats, the parts are provided with a plating of chromium having a minimum thickness of approximately 0.00001 inch (0.15 gr. or 0.00529 oz./sq. ft.).

Another specification for decorative chromium plating, for less severe conditions, specifies a nickel plate undercoat of 0.001-inch minimum thickness after buffing. If copper-nickel undercoat is used, the minimum thickness of the exterior nickel is required to be 0.0004 inch after buffing, or the minimum combined depth of the copper and nickel on the finished parts is specified to be not less than 0.0001 inch after buffing. The amount of chromium required as the outer coating is the same as that given above. On interior automobile body hardware (ferrous parts), the minimum depth of nickel plate of the finished parts is required to be not less than 0.0005 inch after buffing; if a copper-nickel undercoat is used, the minimum depth of the exterior nickel is required to be 0.0003 inch after buffing with a combined depth of the copper and nickel plate on the finished parts of not less than 0.0005 inch after buffing. The requirement on chromium plate thickness remains the same as that specified above.

The specifications on zinc base parts requiring a decorative chromium finish require a minimum depth of 0.0008 inch of nickel after buffing or, on parts where a copper-nickel undercoat is

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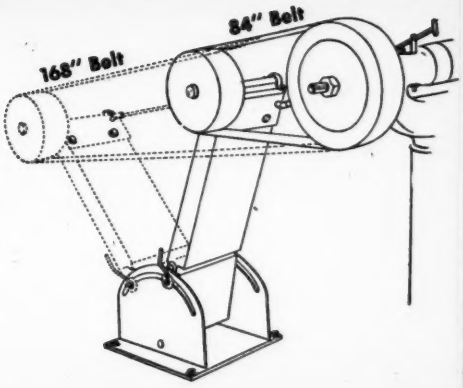

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used, a minimum depth of 0.0003 inch of copper is specified together with a minimum of 0.0003 inch of outside nickel plate, with a combined minimum thickness of 0.0008 inch of copper and nickel. All deposited coatings are calculated after buffing. On zinc cast parts intended for interior body hardware, the minimum nickel plate required is not less than 0.00024 inch after buffing; if a copper-nickel undercoat is used, the minimum depth of the copper layer is required to be not less than 0.0002 inch, with the exterior nickel plate having a minimum depth of 0.00024 inch and finally a total minimum combined thickness of copper and nickel plate of 0.00044 inch. The specification for outside chromium plate thickness on the zinc coat parts is the same as for ferrous parts, being approximately a minimum thickness of 0.00001 inch. All decorative chromium plated parts are required to withstand certain standard salt spray tests, as specified by the Chrysler Corporation.

Specification for chromium plating on steel or cast iron piston rings for wear resistance require a minimum depth of chromium deposit, after lapping, of 0.004 to 0.006 inch. The desired depth of pores in the chromium plate on the face of the finished ring is 0.0007 to 0.0015 inch. The hardness of the chromium plate after polishing off the porous layer is required to be 850 min. Vickers, or equivalent. Also, for this type deposit, it is specified that the surface finish on the chromium plated area of the completed ring, as measured by a Profilometer on the outside diameter at right angles to the side faces of the ring, is not to exceed 90 micro-inches r.m.s.

* * *

Possibilities of Sprayed Zinc Coatings

THE finishing engineer concerned with unusual corrosion problems should keep in mind that zinc metal spraying processes have a definite field and can meet many service requirements of surface protection. Metallizing or metal spraying generally involves an oxyacetylene flame through which a pure zinc wire is passed and melted. A column of compressed air atomizes the molten metal and projects the particles onto the surface to be coated. The surface must, as in all coating proceses, be made thoroughly clean by steel grit or sandblasting using a 16-30 mesh material, and the prepared surface should be covered with zinc before oxidation can take place (see also "Corrosion and Material Protection," September 1946).

Typical of services in which metallizing with zinc has served satisfactorily include the coating of vapor degreasing tanks, water tanks, electric locomotives, transformer tanks, and transportation tanks. It is reported that 0.003 inch of zinc on the outside will protect against corrosion. Other

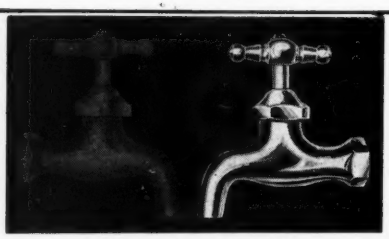

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Table I—Typical Polishing Procedures for Aluminum

Article	Operation	Wheel	Composition
Sheet Cooking Utensils	1. Buffing	Sewed muslin buff	Tripoli
	2. Coloring	Open Muslin buff	Soft silica
Screw-Machine Products	1. Greasing	Felt or Sheepskin	No. 180 or flour emery
	2. Buffing	Sewed muslin buff	Tripoli
	3. Coloring	Open muslin buff	Soft silica
Die Castings	1. Greasing*	Glued rag wheel	No. 100 emery
	2. Greasing*	Felt wheel	No. 150 emery
	3. Buffing	Sewed muslin buff	Tripoli
	4. Coloring	Open muslin buff	Soft silica
Sand Castings	1. Roughing	Glued rag wheel	No. 70 to No. 100 emery
	2. Greasing	Glued rag wheel	No. 100 to No. 220 emery
	3. Buffing	Sewed muslin buff	Tripoli
*May omit one or both	4. Coloring	Open muslin buff	Lime

applications include ventilating, heating, and air conditioning systems and fans for industrial purposes. Refrigerator trailer bodies are also coated both inside and out (see Fig. 2), and sprayed coatings are used to protect steel fastening devices, window sash, structural steel before and after erecting, and railway bridges. Still another unique application includes the metallizing of aircraft and automobile speednuts of heat-treated high carbon spring steel which developed hydrogen embrittlement when acid cleaned for electroplating. Other items on which sprayed zinc coatings have been satisfactorily used include lock and dam gates, gasoline pumps, railway coal cars, and public utility plant equipment.

* * *

Decorative Finishing of Aluminum by Mechanical Means

THE finishing engineer working with the light metals should keep in mind the fact that few metals offer greater possibilities for mechanical finishing than aluminum. This is due to the inherent softness of the metal which presents a workable surface, its natural pleasing color and luster, and its resistance to ordinary corrosion factors without the absolute requirement of supplementary surface protection. Mechanical finishing methods for aluminum include buffing, ball burnishing, satin finishing, scratchbrush finishing, and finishing for hammered effect.

Buffing of aluminum is an operation designed to bring out the natural luster of the metal and if properly performed, mirror-like surfaces are entirely possible. Sheet aluminum may be buffed in the "as fabricated" state but cast aluminum will require ordinary shop finishing operations prior to buffing. These operations will include grinding to break down the "as cast" surfaces and a certain degree of rough polishing to remove the grinding marks. Another practice often preceeding buffing and especially where sand or die castings are involved is termed greasing. Greasing is usually carried out on a felt or sheepskin wheel, faced with No. 100 to 200 emery, and is considered a refinement of rough polishing using a lubricated wheel, thereby breaking down the surface to a higher degree, and by so doing facilitates the subsequent buffing operation. According to recommenda-

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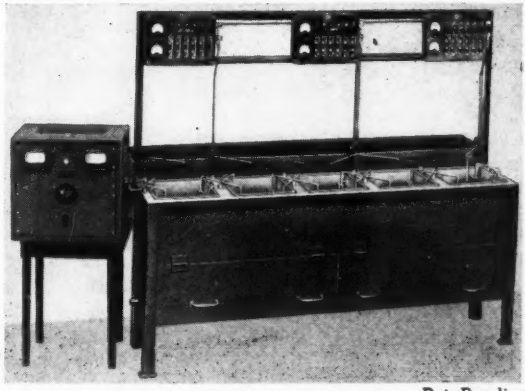

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- Anode and cathode streamlined connections. Anode rods so designed as to bring anodes in the corners of the tanks to prevent burning of the work when circular racks are used. The design also gives maximum effectiveness in minimum area.
- Bus bar connection scientifically arranged and protected under the table.
- SPECPLATER design eliminates solution dripping on anode and cathode rods.
- SPECPLATER unit sold complete with rectifier or in component parts.
- Saves many weary footsteps during the day.
- Keeps your shop neat and clean.
- Eliminates unnecessary dripping.
- Offers compactness and extreme flexibility.

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tions of the Aluminum Company of America, the peripheral speed of wheels used in greasing should be 6,000 f.p.m. since slower speeds will tend to tear the abrasive out of the glue, and higher speeds will cause undue overheating. The lubricants recommended include oil, beeswax, tallow and various tallow compositions.

In buffing wheels, the abrasive is embedded in a grease binder rather than being glued to the surface. Tripoli powder in various degrees of coarseness has been found highly suitable for this purpose. Peripheral speeds of from 7,000 to 7,500 f.p.m. are used in buffing, and the wheels must be dressed frequently to maintain suitable cutting action. It has been found that a harder buff will increase cutting action, but may at the same time produce pits, cloudy areas, or streaks. A compromise must be struck between cutting speed and the degree of polish desired. This is usually accomplished by using softer buffs in a progressive manner until the desired degree of surface finish is obtained. Buffing wheel softness may be increased by using buffs of lower thread count and by increasing the number of spacers between buffs. Typical polishing procedures for aluminum are given in Table I prepared by the Aluminum Company of America.

A coarse line finish, often termed **scratchbrush** finish, is produced on aluminum by means of a rotating wire wheel. The coarseness of the scratched finish can be controlled by the gauge of the wire used in wheel construction; however, for most purposes, wires approximately 0.015 inch in diameter will serve satisfactorily. **Satin** finishing is a refinement of scratchbrush finishing, using smaller wires in the wheel or an abrasive compound. Wire diameters for satin finishing usually vary between 0.002 and 0.005 inch. When the value of the part will permit, **hand-hammering** offers an excellent means for producing unique and different finishing effects.

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MacDermid Bright Copper Plating Process. A process whereby extremely bright copper deposits can be produced for any thickness of plate from a simple cyanide copper solution is described in a folder published by MacDermid Inc., Waterbury 88, Conn. Copy of Folder 7-E free upon request.

"Color in Electromagnetic Energy" is the title of an 18-page folder now being distributed by the Sun Chemical Corp., 100 Sixth Ave., New York 13, N. Y. The relation of the visible light spectrum to the whole electromagnetic spectrum is presented with a simple diagram and brief descriptions of the applications of the various wave lengths from X-rays through ultraviolet, visible length, infrared, and long and short wave radio waves. The function of color chemistry in making color available in a wide range of inks, paints, and finishes is briefly outlined. A chart showing 17 metals and their derived pigments is included. Copy of folder free upon request.

Dusty plants miss production figures. Speed output and eliminate danger of abrasive dusts with:

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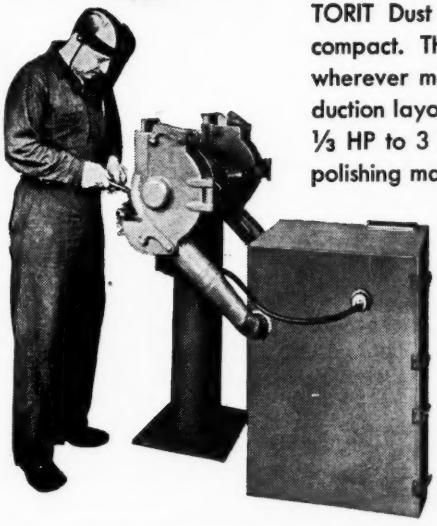

TORIT Dust Collectors are self-contained and compact. The complete unit may be placed wherever most convenient, and moved as production layouts change. They range in size from ⅓ HP to 3 HP and fit all grinding, cutting and polishing machines.

TORIT Dust Collectors are economical. There is no extensive piping and cleaned air is recirculated. For complete information and the latest TORIT catalog, write:

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Barrel Finishing of Metal Products

Part 7—Research in the Development of an Abrasive Bond Barrel Grinding Procedure

By H. LEROY BEAVER
Barrel Finishing Consultant
Lansdale, Pennsylvania

FROM time to time down through the years of our continuing research in matters pertaining to barrel finishing procedure, we have been asked times without number such questions as "How do you get started in this research thing?" "After you have completed one experiment, where do you get the ideas for others and how do you keep the thing moving?" Then comes the one most frequently asked of us, "Why don't you let us in on just one phase of research and let us try it out at the same time you are working on it, and give us a chance to see just how much we can do for ourselves?"

It is this latter question that we are going to discus with you this month, and we are deliberately attempting to do precisely the very thing so many of you have asked of us, and that is to let you in on the ground floor of what might develop into something very promising in the field of barrel finishing procedure.

As to how to get started on a research program, we must say that we don't exactly know what to tell you; but in our own case, it started with a simple curiosity which developed into what we might call a hobby and from the hobby stage it was not too long before the hobby grew into an obsession, and we are still seeking information and probably always will be.

As to a definition of this thing that we call research which is nothing more or less than just experimenting with a lot of things in a lot of ways to accomplish something useful, we might give you two definitions which we quote from an address given by Rear Admiral H. G. Bowen, Chief of the Office of Naval Research, to an audience on Navy Day of 1945, as follows:

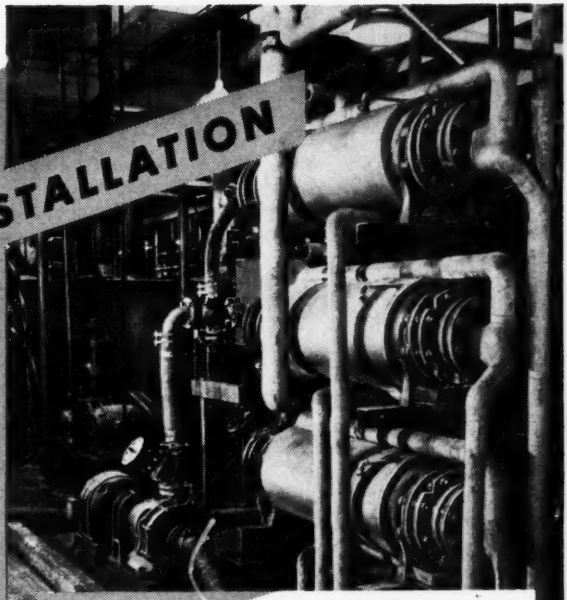
"Research is a philosophical, exploratory, imaginative pursuit, inherently experimental and speculative."

This we liked very much, but Admiral Bowen followed this with what he termed a more homely definition of his own and that we favor even more, for he said:

"If you know what you're doing, it isn't research."

This latter definition exactly and precisely fits our own case, for time and time again we have started on something out of which we had no idea what would develop, and more times

HOW THIS PLATING INSTALLATION IS FORTIFIED AGAINST CORROSION



One of five Durco plating equipment arrangements handling bright nickel plating solution at the Daystrom Corporation plant, Olean, N. Y. The fifteen Durco heat exchangers, operating on 70 psi steam, raise 40,000 gallons of the solution from 100° to 160° F in approximately eight hours.

Every vital part of this bright nickel plating set-up is permanently protected against corrosion. The heat exchangers, pump, valve and split-flanged fittings are all made of Duriron—the high silicon iron with almost perfect corrosion resistance.

Durco equipment can fortify your plating operation against corrosion-caused replacement costs. Write for details of complete plating set-ups or individual equipment units. Ask for Bulletin Folder S.

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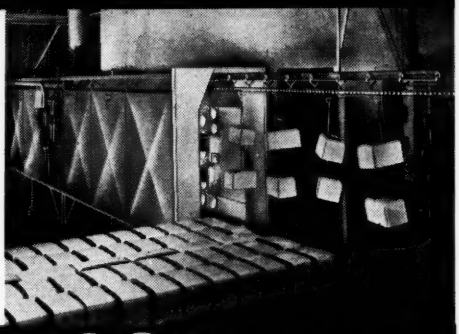
than we would like to admit the final result was just about plain nothing. So we won't give you that sort of a discouraging start, for this one on preliminary examination really shows some promise.

First, we are going to direct our attention to those who use barrel finishing procedure in what is known as "cutting down" operations. How many of you recall having asked us at one time or another just why cutting down operations cannot be carried out with something other than water as a medium for holding abrasives in suspension or, in lieu of that, oil in some form and for the same purpose? This you found was difficult to remove from the surface of the parts and especially from grooves, pores, areas of sub-surface porosity, and the like. We never did and do not now like water for this purpose and the reason why is that water has a specific gravity of 1.00 and almost every abrasive that we use in barrels has a greater specific gravity than 1.00. Thus, when a cutting down mass (that is, parts, water, and abrasive) is used the water surges down through the mass, carrying the abrasive to the bottom of the barrel where, for the most part, it follows the periphery of the barrel and consequently parts suspended in the mass do not get their share of abrasive action. Something of the same sort occurs with oil, and if an oil with sufficient viscosity is used to hold the abrasive grains in suspension, and it's generally a mineral oil, it will be found entirely too difficult to remove when the barreling operation is concluded and before such further operations as plating, spraying, dipping, and so on, are undertaken.

To those of you who have followed the previous series, you will remember that we have told you several times that nothing is or will be reported unless the operation has actually been

Today's Best Buy In Infra-Red Ovens

When economy and efficiency count, you are money ahead with a Jensen "dual heat" infra-red oven. At Commercial Enameling, Detroit, Jensen installed a 20' oven for baking white enamel on bakelite radio cabinets. Commercial Enameling reports: (1) Substantial savings on power because "dual heat" accomplishes desired temperatures with fewer lamps, less wattage. (2) Spoilage held to less than 2% because "nesting" of lamps eliminates danger of discoloration.
★ Before you buy, write Jensen!



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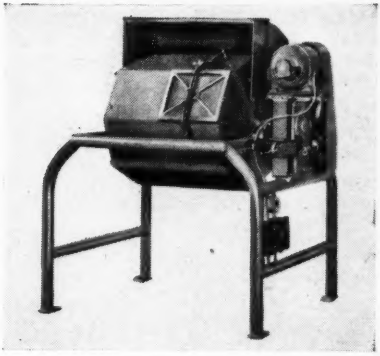

Time after time, users report *greater output* and *tremendous labor savings* with Almco deburring and finishing barrels. Here are some of the reasons behind these performance records:

4 SPEEDS, QUICKLY SELECTED. Lever releases V-belt for quick selection of the *right speed for each job.*

HYDRAULIC BRAKE, controlled by start-stop reverse lever, permits quick positioning of the barrel *by power* for loading and unloading.

QUICK-CLAMP, LIGHT-WEIGHT DOORS. Compartment doors are closed by simple toggle clamp lever. Doors are rugged, yet light in weight for safe, easy handling.

EXTRA-WIDE DOOR OPENINGS eliminate pocketing; permit rapid and *complete* unloading.

UNOBSTRUCTED ACCESS to barrel further facilitates loading and unloading.

11 BARREL SIZES meet every requirement. Barrels are octagonal, of welded steel, unlined or with full neoprene lining; quickly flushed clean for change-overs.

AUXILIARY EQUIPMENT includes portable power screen, mobile electric hoist, hoist pan and storage hopper. Cuts labor costs still further.

As a first step toward faster, lower-cost precision deburring and finishing, write for full details on Almco barrels and related items.

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performed and has been proven to be both mechanically possible and commercially practicable. Please, understand that this present undertaking is something entirely different and is completely untried by us, and we have no recollection of ever having seen or read anything in the entire bibliography of barrel finishing, that would have even a remote connection with either materials we plan to discuss or the manner in which they may be used.

Perhaps we had better tell you just how we happened on this phase, for it may be interesting to you and it might tend to show you how far afield we sometimes get from our main subject or our main line of activity. In nearby Lansdale, Pa., we have a friend who recently opened a candy factory which we were invited to inspect. In the course of our inspection tour, we unconsciously placed our hand flat down on a table top, but when we tried to lift it off we were impressed with the fact that we were "stuck" for we just chanced to come flat down on a decidedly sticky but crystal clear substance which someone had spilled on the table, said substance being known as "confectioners glucose." How to remove it? Well, that was simple too, for all we needed to do was to hold our hand under the running water from the faucet and the glucose immediately went into solution and was cleanly rinsed away.

If you are following us as carefully as you should, then you should also by this time have sensed that here was a substance which might readily lend itself to barrel finishing procedure, since in itself it had two properties that neither water nor oil possessed and that is unusual viscosity and complete and easy rinsability. Moreover, if, when in a barrel, it would coat all the inner surfaces of the barrel and thus hold abrasive in suspension to be utilized on rubbing contact of the parts with the periphery or end plates of the barrel and as well to coat the finishing material whether that be minerals or metals and the parts themselves. In other words, there could be no way conceivable to us whereby the abrasives could be prevented from making the most adequate and complete contact during the entire process of the barrel finishing cycle with the parts we sought to finish.

Further than this, on completion of the operation the quality of its almost immediate solubility in plain tap water would make cleaning operations decidedly easy. Still further than this, if after rinsing, the parts are passed through the regular cleaning cycle, using standard cleaners and either still or electrically controlled an unusually clean surface will be obtained that would provide an excellent base to assure dependable adhesion of any subsequent layers of electrodeposited surface or of sprayed nitrocellulose lacquers or simple paint.

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Type S Centerless

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This versatile machine combines a centerless feed polishing machine with a vertical or horizontal belt grinder, surfacer, polisher or buffer. Ideal for cylindrical polishing or straight line finishing on flat work. Can be used for anything that can be ground or polished—metals, rubber, fibre, wood, etc.

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From high speed copper to chrome, and anodyzing to cleaning and rinsing tanks, Sarco has a complete line of temperature controls. The cost varies according to the problem involved, but for the purposes illustrated the simple, inexpensive Sarco LSI Electric Control will do the trick.

It combines accurate temperature indication with automatic control. It is used extensively for both heating and cooling because it costs less, is more reliable and because of the easy adjustment by thumb screw and the built-in dial thermometer.

This is only one of the many Sarco plating controls which range from the low cost Sarco Thermoton, for approximate control of cleaning and rinse tanks, to the highly accurate TR-21 regulator used on many automatic plating operations.

Our representative can show you how others have solved plating problems similar to yours.

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SARCO Saves Steam

SARCO CANADA, LTD., 85 Richmond Street, West, TORONTO, ONTARIO

You will probably ask "Well, what is this glucose anyhow?" That is a fair question. We did not know either exactly, but it seemed to us that it might be something like the clear syrup that you buy at your grocers and that is rather popularly known as "Karo," only this was twice and maybe three times as heavy in viscosity. So, not knowing ourselves what it was, we looked it up for both you and ourself, and here is the definition of commercial glucose: The glucose of commerce,, which may be regarded as a mixture of grape sugar, maltose. and dextrins, is prepared by hydrolysing starch by boiling with a dilute mineral acid. In Europe potato starch is generally employed; in America, corn starch. The acid employed may be hydrochloric, which gives the best results, or sulphuric, which is used in Germany; sulphuric acid is more readily separated from the product than hydrochloric, since the addition of powdered chalk precipitates it as calcium sulphate, which may be removed by a filter press. The processes of manufacture have much in common, although varying in detail. The following is an outline of the process when hydrochloric acid is used: Starch ("green" starch in America) is made into a milk with water, and the milk pumped into boiling dilute acid contained in a closed "converter," generally made of copper or cast iron; steam is introduced at the same time, and the pressure is kept up to about 25 lb. to the sq. in. When the converter is full, the pressure is raised somewhat, and the heating continued until the conversion is complete. The liquid is now run into neutralizing tanks containing sodium carbonate, and after settling, the supernatant liquid, termed "light liquor," is run through bag filters and then on to bone char filters, which have been previously used for the "heavy liquor." The colorless or

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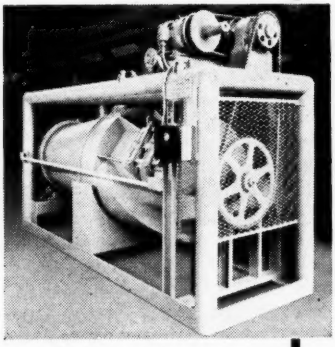
This new Howard Mill deburrs the most delicate parts, regardless of shape or size, without nicking or damaging. Mass tumbling action saves you time. Large quantities of parts are processed in the time formerly required to finish a few by hand. We'll be glad to prove it. Send us your sample parts.

Machinery for Pickling • Tumbling Deburring • Washing • Quenching Drying • Burnishing



No. 265 Deburring and Tumbling machine. Illustration shows interior of the new Howard Mill. *Write for New Catalog.*

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Suppose your work-load changes and you need a different range of d-c voltages, or increased current at low voltage. Will your present d-c source "tie you down," requiring replacement to meet the new conditions?

Not if you depend on G-E copper-oxide rectifier units for plating or anodizing power. You can buy one or more individual units today, reconnect them or combine them with additional units tomorrow, and operate with no sacrifice in efficiency.

G-E plating and anodizing rectifiers are part of a complete line of plating and anodizing *systems* developed by G.E., including manual or completely automatic voltage control. For full information or help in selecting a power-saving plating system, write Section A5-368 Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

(Above) Bank of G-E "500" Rectifiers, showing compact multiple-unit arrangement.

GENERAL ELECTRIC

amber colored filtrate is concentrated to 27 to 28 deg. Bé. when it forms the "heavy liquor" just mentioned. This is filtered through fresh bone char filters, from which it is discharged as a practically colorless liquid. This liquid is concentrated in vacuum pans to a specific gravity of 40 to 44 deg. Bé., a small quantity of sodium bisulphite solution being added to bleach it, to prevent fermentation, and to inhibit browning. "Syrup glucose" is the commercial name of the product; by continuing the concentration further, solid glucose or grape sugar is obtained.

Several brands are recognized. "Mixing glucose" is used by syrup and molasses manufacturers, "jelly glucose" by makers of jellies, "confectioners glucose" in confectionery, "brewers glucose" in brewing, and, if this research comes to anything, perhaps we can add still another classification, "barrel finishing glucose."

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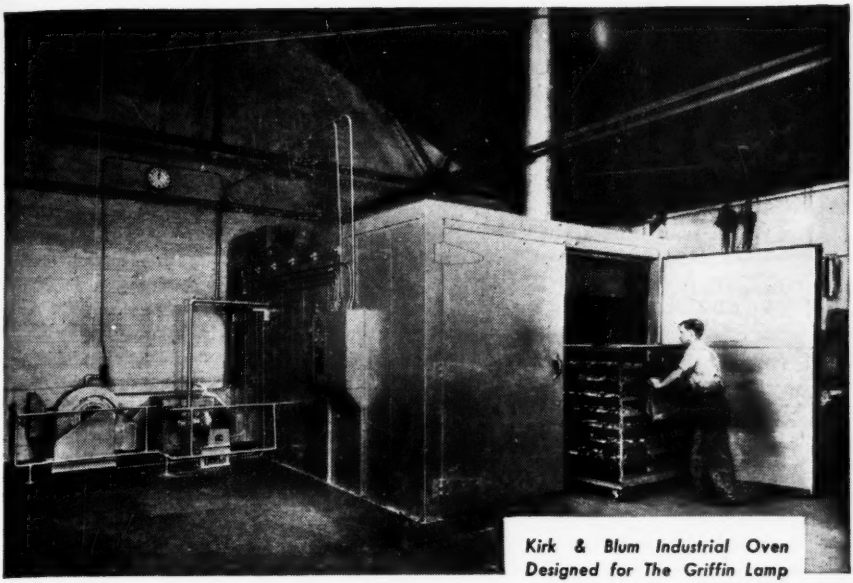
Haverhill **Mass.**

And where can you buy "confectioners glucose"? If you have a candy maker in your town or city, you should not have too much difficulty in talking him into selling you say, one gallon of it in bulk. This should be at least sufficient to cover a few experimental runs, and after that, provided the research proves to be workable in your regular production procedure, then either a wholesale confectioners supply house or perhaps the Corn Products Refining Company would be agreeable to supplying it to you direct. Normally, the cost should not be greater than a heavy viscosity oil.

As to how much you should use to a barrel load of finishing material and parts, we don't know. You will have to cut and try on this phase for that after all is a part of your research too. If we are to do this, then we would start with about one quart of glucose in bulk for each bushel of mass, that is, finishing material and parts, but only a sufficient amount should be used to provide a thin coating for the steel balls or shapes of the mineral materials such as fractured stones, processed stones, Danish Pebbles, and so on. After these materials have been completely coated so that they present a glazed appearance, you may then add the same abrasives that you have previously used with either water or oil and proceed with your cutting down or surface area removal of material from your parts.

In any research, once we have the initial material we cannot afford to stop with that, because if the first effort fails, then we are at a dead stop. Thus, as a secondary material, we must cast about to find something having somewhat the same properties as the material we planned to initially use, in order that the research along this special line might be prolonged or have what we term continuity. Now suppose you just lay this issue of PRODUCTS FINISHING down on the table—simply stop reading right



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speeding finishing operations...

To meet the special requirements of The Griffin Lamp Company, Kirk & Blum Engineers designed and built this direct gas-fired automatically controlled oven unit with a maximum operating temperature of 450°F to bake the paint finish on auto lamps.

The lamps are dipped, sprayed, placed in wire mesh trays and stacked in the oven trucks. Each truck holds 32 trays and the capacity of the oven is four trucks per charge providing a production rate of 8 trucks per hour based on a 30-minute bake.

Manufacturers—large and small—have proved beyond a doubt that Kirk & Blum engineered baking and drying systems will produce better finished products at lower cost.

Put your finishing problems up to Kirk & Blum—they have the engineering knowledge and experience to design and build svstems that are guaranteed to meet the most exacting finishing requirements. Write The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati 25, Ohio.

KIRK AND BLUM
INDUSTRIAL OVENS

here—and think of some other material having something of the same characteristics as the "confectioners glucose" we have just described, and by that we mean a viscous material that would hold abrasives in suspension and at the same time be almost immediately soluble in simple tap water, so that it could be washed or rinsed away immediately on completion of the barrel finishing cycle.

Can't think of anything? Well, that will be all right too, because this may be your first journey into research, but try to always remember that little axiom that was taught to you in the grammar grades years ago, "If at first you don't succeed, try, try again." After all that's all there is to research, you just try and keep on trying until you reach your goal.

Ever hear of "crude glycerin?" This will be your secondary material. Not the refined type such as is used by druggists, but simply crude glycerin such as you can readily obtain from your regular chemical supply house. Maybe we should tell you something about this material or substance too, so here is your secondary definition: Glycerin is a viscid, colorless liquid of the specific gravity of 1.265 at 15 deg. C., possessing a somewhat sweet taste; below 0 deg. C. it solidifies to a white crystalline mass, which melts at 17 deg. C. When heated alone, it partially volatilizes, but the greater part decomposes; under a pressure of 12 mm. of mercury, it boils at 170 deg. C. In an atmosphere of steam, it distils without decomposition under ordinary barometric pressure. It dissolves readily in water, and alcohol in all proportions, but is insoluble in ether. It possesses considerable solvent powers and thus is employed for numerous purposes in pharmacy and the arts. Its viscid character and its non-liability to dry and harden by exposure to air also adapt it for other uses such as lubrication and so on, while its peculiar physical characteristics, enabling it to blend with either aqueous or oily matters under certain conditions render it a useful ingredient in a large number of products of various kinds.

Thus, we have two products, confectioners glucose and crude glycerin, both viscous in character to such an extent that either will hold abrasives in suspension, and both almost immediately soluble in plain tap water. All that we have previously said regarding the confectioners glucose may be repeated with regard to crude glycerin, but there is a difference we should note and that being the glucose will be found to be much heavier in viscosity than the glycerin. It is very likely that both could be used to advantage, the heavier and more viscous for the larger grain sizes of abrasives and the lighter and less viscous for the range of very small grain sizes. Where more is desired in the way of a smooth finish than of a rapid rate of removal of surface area, or since either can be almost immediately rinsed from the

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1. Reduces fumes
2. Conserves acid
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PIONEER PRODUCERS OF SURFACE COATING FLOCKS

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barrel and finishing material, both products might be used on a given line of parts, the glucose with coarse abrasive for the initial cutting down operation, to be followed by the glycerin and a fine abrasive for the final or smoothing operation. The latter or double operation, of course, is classed as a variant to the original research concept.

In order that you may have all of the starting information that we have, we should tell you of just one simple test we made with both of these materials. We took two strips of thin steel, 4 inches wide by 10 inches long. On one we poured a small puddle or blot of glucose which we spread out evenly with a strip of cardboard much like one would use a spatula. On this we placed a small handful of turkey size Mica Schist Grit (granite), pressed it down and then stood the strip up perpendicularly. The abrasive held firmly to the strip and did not creep.

Are you rumbling around for a way to polish metals? Why not check Lupomatic's method.

For efficiency in finishing metal parts, install a DEBURRMASTER.

Save time, money and produce assured results.

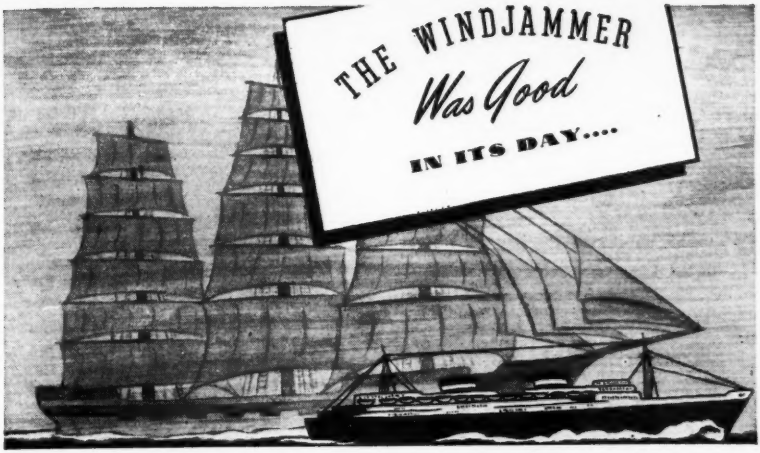
LUPOMATIC TUMBLING MACHINE CO., INC.
4510 BULLARD AVE. BRONX, N. Y.

On the second strip we performed a similar operation, using only a blot of crude glycerin which we spread on in the same manner and also applied the same size Mica Schist Grit. The glycerin being of leser viscosity than the glucose, the abrasive in this case, after a short pause, started to very slowly creep toward the bottom of the strip, which would seem to indicate that the heavier glucose might best serve when the larger grain sizes of abrasive materials were used. Whether fine abrasive would also creep on the glycerin coating, we cannot say, for we did not proceed that far with our tests.

We have no special choice as to the type or size of barrel that you should use for this test. If you have been conducting your cutting down operations in an oblique tilting type, use that, and if in an enclosed either high and narrow or long and narrow type, then use that. The only difference is that you will be using either glucose or glycerin instead of the water or oil which you previously used.

This research technique is something that you have asked for and we hope that you will have an interesting experience and as well a profitable one, and, inasmuch as we have been reporting to you these many years in PRODUCTS FINISHING, maybe the situation should be for this once at least reversed and the reports should come in the other direction. You may be sure that a report of your results will be appreciated both by our editor and your author. These should be addressed either to PRODUCTS FINISHING direct or to us personally at Lansdale, Pennsylvania.

"Bake, Dry, Heat with G-E Industrial Infra-Red Lamps" is the title of a bulletin published by the General Electric Co., Nela Park, Dept. P-2, Cleveland 12, Ohio. Copy free upon request.



BUT . . .

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING

Granodine
Duridine
Alodine
Litheform
Thermoil-Granodine

RUST REMOVING AND PREVENTING

Deoxidine
Peroline

PICKLING ACID INHIBITORS

Rodine

Realization of the need for faster and more economical transportation led to the creation of sleek, powerful liners that now are but a few days from the farthest port.

In a similar transition, aluminum rust proofing and paint bonding have attained a new high in efficiency, simplicity and economy with . . . .

Alodine*

Wherever aluminum and its alloys are used, ALODINE is today's choice for effective rust prevention and paint adhesion.

The process is extremely rapid -- 2 minutes or less and it is operated at almost room temperature. Coating and sealing are accomplished simultaneously in a chemical bath without the use of electric current. Mild steel equipment, except the ALODINE tank which must be of stainless steel, contributes to the simplicity of the process.

If you are an aluminum fabricator, interested in obtaining the utmost protection for either painted or unpainted aluminum, in a simple process which requires only a minimum of handling and equipment, then write for a questionnaire and a descriptive leaflet on ALODINE.

*Trade Mark Reg. U. S. Pat. Off.

AMERICAN CHEMICAL PAINT CO.
AMBLER PENNA.

National Metal Finishers Association, Inc.

THE National Association of Metal Finishers, Inc., was recently incorporated under the laws of the State of Michigan, with offices located at 2236-39 Dime Building, Detroit, Michigan.

For several years, members of the metal-finishing industry were cooperating with one another in meeting wartime situations and, since the war, several meetings were held in Detroit, Chicago, and New York. At the annual dinner of the industry held in Pittsburgh on June 18, 1946, an Organization Committee was appointed to prepare by-laws and form a National Association of metal finishers. This committee met on several occasions and prepared by-laws, after which directors were elected preparatory to incorporating an association.

On December 4, 1946, the directors met at the Park Central Hotel, New York City, and elected the following officers: President, Ed. J. Musick, Musick Plating Co., 206 S. Ninth St., St. Louis 8, Mo.; 1st Vice President, R. A. Campisi, Industrial Enameling Corp., 81 Hano St., Boston 34, Mass.; 2nd Vice President, C. R. Crawford, Chrome-Rite Co., 4534 W. North Ave., Chicago, Ill.; 3rd Vice President, Harold E. Coombes, 165 S. Fair Oaks Ave., Pasadena 3, Calif.; Treasurer, Henry Bock, Auto City Plating Co., 3456 Denton, Detroit 11, Mich.; Executive Secretary, Raymond M. Shock, 2236-39 Dime Bldg., Detroit 26, Mich.; Director, Colgate Gilbert, Gilbert Associates, Inc., Box 715, Walpole, N. H.; Director, Marus D. Rynkofs, 525 N. LaBrea Ave., Los Angeles 36, Calif.; Director, Walter Plumacher, R. Plumacher & Sons, 344 E. 59th St., New York, N. Y.; Director, Philip Sievering, Jr., Philip Sievering, Inc., 199 Lafayette St., New York, N. Y.; Director, Joe L. Barr, Gate City Plating, 2307 Grand Ave., Kansas City 8, Mo.; Director, Paul Henning, Detroit Plating Industries, 1033 Mt. Elliott, Detroit 7, Mich.; and Director, W. O. Zinn, National Plating Co., 609 W. Fulton St., Chicago, Illinois.

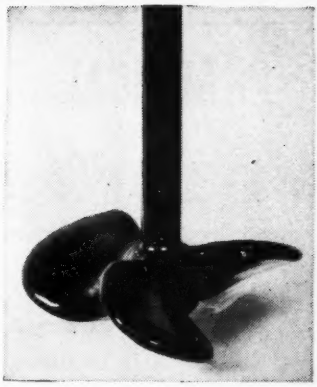
During the year of 1946, matters of importance were accomplished by the Organization Committee, which actually functioned prior to the incorporation of the association, and a year-end bulletin consisting of 53 pages was sent to all members. In addition to the year-end bulletin, monthly bulletins were issued and will be issued by the association as a part of its activities. By-laws were adopted by the board of directors as recommended by the Organization Committee. There is one class of membership in the National Association, this being a local association consisting of five or more members of the industry, each local association having a voice in the functions of the National Association by virtue of its membership.

Raymond M. Shock, the executive secretary, is now meeting with local groups of metal finishers throughout the country, helping them to organize into local associations, and it is hoped that during the year of 1947 most all metal finishers throughout the country will have an interest in this organization. Any local group of metal finishers desiring further information and a copy of the by-laws or bulletins can receive same upon writing to the office of the Secretary, National Association of Metal Finishers, Inc., 2236-39 Dime Building, Detroit 26, Michigan.

The first annual meeting of the association is scheduled to be held in Detroit on June 22 to 25 at the Hotel Statler.

RUBBER PROCESSED ON METAL

Rubber Insulated Plating Tank Agitator



Rubber 1/8" thick, has been applied to the surface of this agitator to prevent the metal coming in contact with the plating solution. This prevents corrosion and contamination.

ANY PRODUCTION PART OR PRODUCTION PROCESSING EQUIPMENT CAN HAVE RUBBER APPLIED TO THE SURFACE

★ **Irregular surfaces; concave, convex, sharp angles, etc., can be covered partially or entirely. ARCO rubber offers positive coverage to any desired thickness insulating for electricity, sound or contact, corrosion, abrasion or shock.**

You can use ARCO rubber insulation: (1) to protect parts and equipment, (2) on handling equipment to protect precision or delicate surfaces, (3) to conserve plating materials.

STANDARDS-*FURNISHED COMPLETE OR YOUR EQUIPMENT RUBBER PROCESSED*

ANODE, DIPPING & HANDLING BASKETS

PLATING AND PICKLING TANKS

TANK GRIDS AND SCREENS

PLATING RACKS

DRUMS AND PAILS

AUTOMOTIVE RUBBER COMPANY, INC.
8607 EPWORTH BLVD. • DETROIT 4, MICHIGAN

PRACTICAL APPLICATIONS *of Modern Products*

"Cocoon" Protects Metal Equipment from the Elements

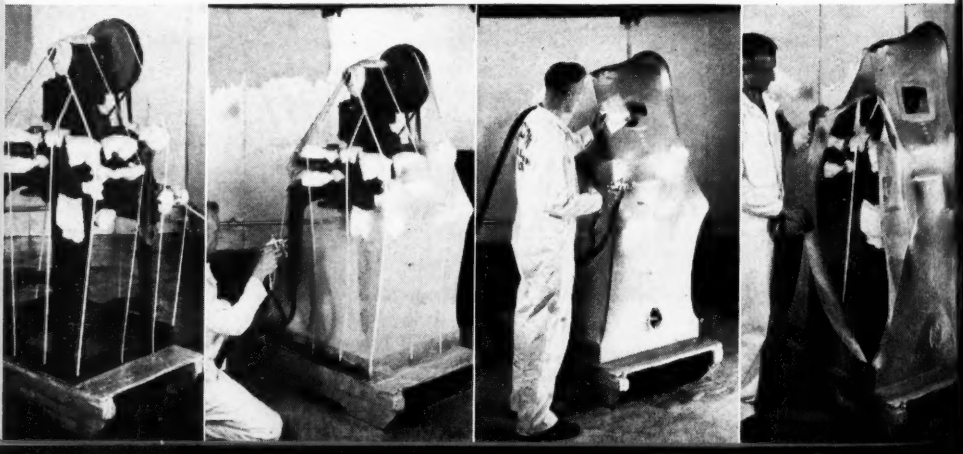
"COCOON" is the trade marked name of a unique packaging plastic consisting of modified film-forming vinyl resins carried in volatile solvents which has been developed by the Coatings Division, R. M. Hollingshead Corp., Camden, N. J. In performing the packaging process, the plastic is generally applied by the spray method although for some types of work dipping has been found a more practical means of application.

The spray packaging method affords a simple and quick means of packaging parts, assemblies, or complete machines (as illustrated herewith), regardless of size or complications. The process consists of an initial spray operation which bridges large openings and voids with long web-like plastic filaments that completely enclose the item being packaged. Subsequent spray applications provide for a durable, tough, flexible, moisture impervious package which is designed to withstand exposure to wind, rain, snow, and sunlight over long periods.

Abrasion Tester Expedites Coating Research and Control

A PROMINENT producer of a plastic-base production-type organic coating makes regular use of the Taber Abraser, an abrasion-analysis

(Left) Machine prepared for application of webbing coat. Note padding on sharp projections and vertical tapes. (Left Center) Webbing coat being applied. Threads bridge over gaps between tapes but do not penetrate to the machine. (Right Center) Window can be inserted for visual inspection of inside of package if desired. Slit in package enables trapped solvent vapors to escape. (Right) "Cocoon" being stripped from machine. Note that the coating does not adhere to metal surfaces, pads, or other areas.



DIXIE

DUST COLLECTING SYSTEM

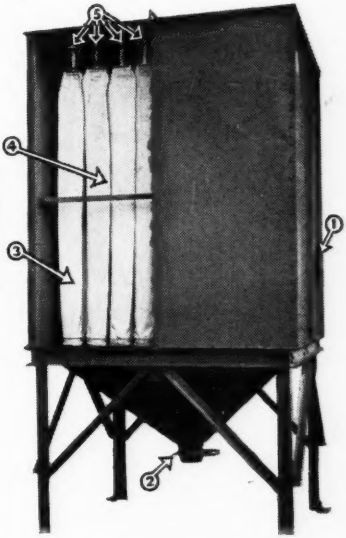
AVOID "DUST BLEMISH"

Whether your product finishes are paint, lacquer, varnish, enamel or plain uncoated metal . . . wood . . . plastic . : : avoid "dust-blemished" finishes that can mean the difference between profits and loss. Light, fine dust from metal cleaning, plating and polishing operations can be trapped, collected, controlled or removed by Dixie. Stop risking dust reaching your product finishes . . . getting into your precision machines . . . filling the air your employees breathe.

DIXIE "SNAP ACTION" GETS RESULTS

Dixie Tubular Dust Collectors are simple in design . . . sturdily built . . . positive in action . . . gives smooth, non-vibrating operation. Here's how Dixie protects products finishes . . . safeguards employees.

1. Dust-laden air enters below bottom plate
2. Large portion of dust settles in hopper
3. Fine dust rises and collects inside of tubes
4. Filtered air passes through porous walls
5. Dust forced into hopper by Dixie "Snap-Action".



Dixie Dusty Says:

"Dixie not only protects your products from "dust-blemished" finishes, but safeguards your employees from occupational hazards that increase absenteeism. Wire today . . . no obligation!"

DIXIE MFG. CO., INC. 1324 RUSSELL STREET BALTIMORE 30, MARYLAND

"tool" of the design illustrated herewith, to gage "wear mileage" provided by his product. That a precise, accurate evaluation of resistance to normal abrasive wear is regularly obtained is due basically to the fact that this electrically-operated wear-inducing instrument accelerates the rate of normal abrasion many times over while simultaneously duplicating its effects to a remarkably close degree.

The technique itself is unusually

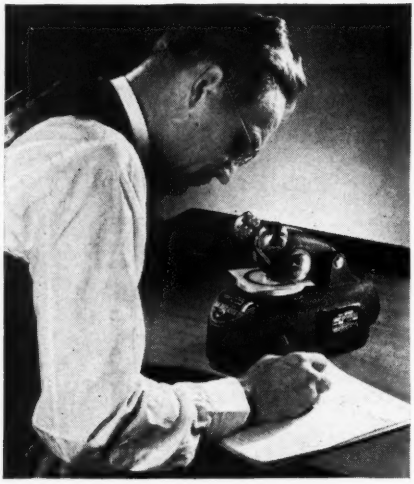


Illustration showing abrasion testing device used in coating research and control

simple. Panels coated with the particular finishing material selected for abrasion-resistance testing are mounted on a motorized turntable that revolves at constant speed under a pair of specially-formulated abrasive-embedded "wear wheels," which provide the rubbing-and-rolling action demanded in a laboratory test of this particular type. The total number of revolutions required to abrade the coating of a given thickness provides a reading (recorded by a built-in Veeder-Root countrol) of the resistance against mechanical abrasion afforded by the particular material under test.

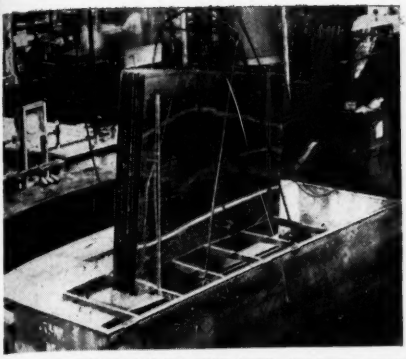
A similar convenient, fast routine is utilized by a Northwestern New York supplier of lacquers and allied protective coatings to accurately determine product durability. The wear-testing technique is one of several laboratory research procedures followed by the company to maintain and safeguard quality control.

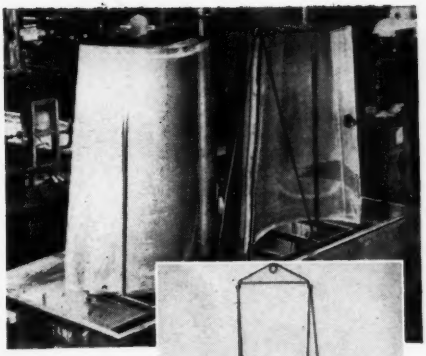
Still another case study of particular interest to product finishers, revealing how the Taber abrasion test contributes to effective product development and quality improvement research devoted to the use of industrial coatings, is derived from the experience of a well-known manufacturer of business machines. Here, a lifetime of wear is measured in a matter of minutes as the Abraser scientifically determines the wear rate of surface finishes subjected to rubbing abrasion.

Lift Truck Reduces Materials-Handling Costs at Emsco

AT the Emsco Manufacturing Co., Los Angeles, heavy metal products are moved miles daily between the first stage of processing and the final step where they are loaded into freight cars by means of a gasoline-driven hydraulic lift-type truck built by Salsbury Motors, Inc., Pomona, Calif. Known as the "Turreteer," the vehicle incorporates a revolving turret (similar to the gun mount of a warplane) to house its engine, a fully-automatic clutch and transmission, and driving wheel. By turning the "turret," the operator can apply power in any direction needed, thus increasing maneuverability of the truck.

Among the uses for which the Turreteer is being efficiently and economically employed at Emsco is in the handling of water heater tanks. As





CAMBRIDGE

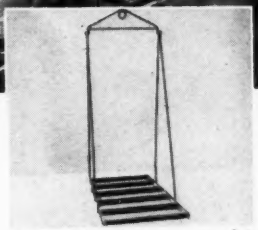
Solves your Problems

with DESIGNS FOR SPECIAL PURPOSES

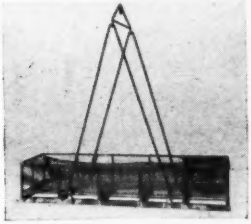
WHEN you have a special problem—it's wise to look to Cambridge for a practical solution! Illustrated here is one of many "designs for special purposes" made by Cambridge in all metals or alloys. In operation above is a special rack made to accommodate both flat and curved sheets in cleaning processes. A variety of small parts may be handled efficiently through the same process in a specially designed wire screen basket shown at right.

If you have a project involving special designs in metals or alloys, we welcome the opportunity to show you some of the many ways in which Cambridge has served diversified industries—how we can help you solve your problems. No obligation, of course. Write Department 18.

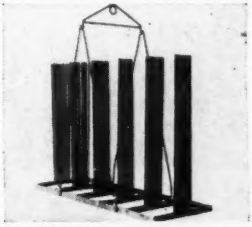
FREE Valuable technical information. Practical reference catalog on wire crates and baskets. Write for copy.



Rack designed to accommodate pins on various centers for holding flat or curved sheets.



Wire screen basket designed to fit the rack above for convenient and efficient handling of a variety of small parts.

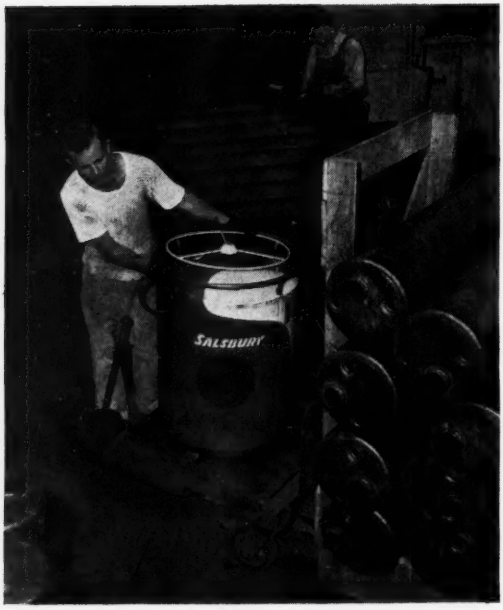


Pins inserted on minimum centers for flat and curved sheet cleaning operations as shown above.

CAMBRIDGE WIRE CLOTH CO.

CAMBRIDGE, MARYLAND

Boston • New York • Baltimore • Pittsburgh • Detroit • Chicago • St. Louis



Hot-water heater tanks coming off the production line at Emsco Manufacturing Company are transported to the galvanizer on a Salsbury "Turreteer" lift truck.

the tanks come off the end of the structural steel production line, they are loaded 25 to a skid rack, which is picked up by a hydraulic lift of the Turreteer and carried 200 yards to the galvanizer. As they leave the galvanizer, the tanks are again loaded 25 to a rack and transported directly to the freight car loading platform by means of the truck.

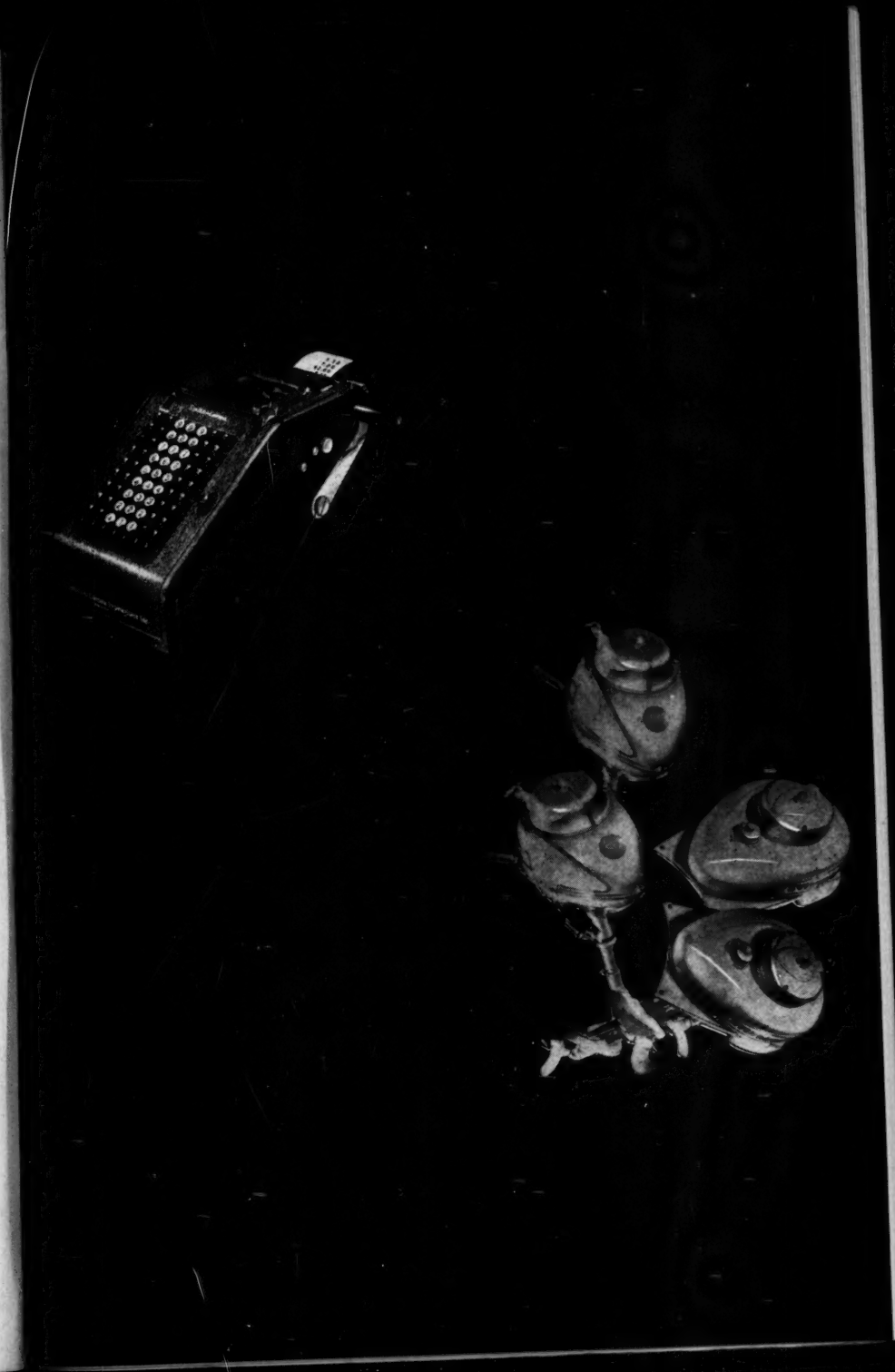
Rustproof heavy fencing is also being galvanized by Emsco at the rate of 9 miles a day, with the fencing being transported to and from the galvanizing tanks on a Salsbury Turreteer.

Removing Oxide Coatings on Aluminum

GLYCERINE has many uses in the treatment of aluminum and its alloys. One of the latest is a method for removing the oxide film that forms on aluminum surfaces. As pointed out by M. A. Miller and W. E. White in U. S. Patent 2,399,134, there are several methods for removing these oxides, but most have the disadvantage of removing some of the underlying metal or of requiring heat and providing only slow action. To overcome these difficulties, their patent describes the use of solutions containing hydrogen fluoride and water, the balance being an alcohol, like glycerine. The solutions are prepared by passing anhydrous hydrogen fluoride into the liquid alcoholic fluid until a 5 to 40 per cent concentration is obtained. An illustrative basic formula is as follows:

Water	1-5 per cent
Hydrogen fluoride	5-40 per cent
Glycerine, to make	100 per cent

The article from which the oxide is to be removed may simply be immersed in the solution for a suitable period of time or the solution may be applied to a given area of the metal. The cleaned surface is then washed with water. Treatment time will depend on the type of coating, the hydrogen fluoride content of the solution, and the temperature. This kind of treatment is useful in metallurgical analysis, for removing the films during electrolytic brightening, for cleaning prior to joining operations, and for removing aluminum oxide prior to the performance of a subsequent coating process.



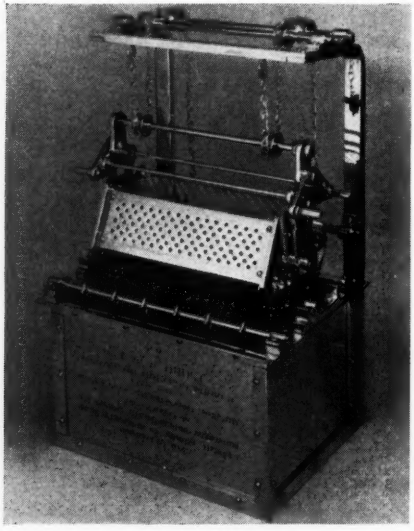
NEWS of the Industry

Unique Gift Presented at Platers' Banquet

The annual banquet of The Masters' Electro-Plating Association, Inc., New York, was held on Saturday, January 18, 1947 at the Park Central Hotel, New York City. Approximately 160 people attended. The feature of the evening was a presentation of a model of a plating barrel to Joseph F. Brust, president of Brust Bros., Brooklyn, N. Y., in recognition of his loyal and tireless service to the electroplating industry. At the same time, orchids were presented to Mrs. Burst and Miss Bessie Siegel (Mrs. Norman J. Young) in recognition of their aid to the firm.

The model was made entirely of brass and plated all over with a heavy coating of gold. The model was produced in the shop of one of the members of the Masters' Electro-Plating Association—the National Chromium Corp., 34 Hubert St., New York, N. Y. The gold plating was done by Edward Fascher, 473 W. Broadway, New York, another member of the organization.

This presentation continued a custom which was begun before the war by the Masters' Electro-Plating Association. In 1939, a dinner was held in honor of the late Philip Sievering, signalizing his 50th year of continuous business operation. Mr. Sievering was presented with a gold plated model of a plating tank. The war interrupted these celebrations, but they were resumed last year with the presentation of an engraved plaque to Walter Plumacher of R. Plumacher & Sons, 344 E. 59th St., New York City, for his services to the industry.



Gold plated model plating barrel presented to J. F. Brust by Masters' Electro-Plating Association

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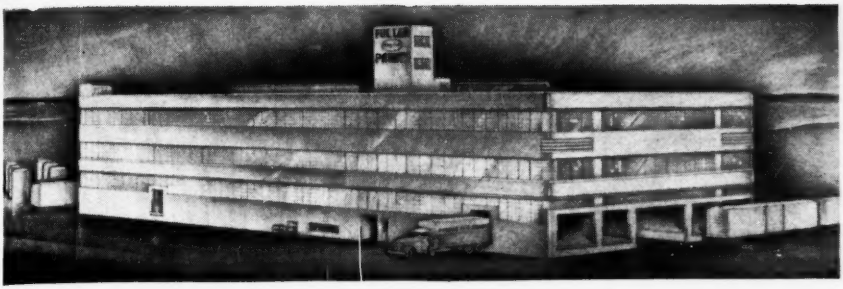
Fuller-Nason Industrial Division

Western users of industrial finishes were recently notified of the formation of the new Fuller-Nason Industrial Division of W. P. Fuller & Company. The new division brings together the industrial finishes sections of W. P. Fuller & Company, pioneer Western paint firm, and R. N. Nason & Company, also a pioneer company and a leader in the development of many modern industrial and automotive finishing products and techniques. Outside the field of industrial finishes, the two companies will continue their independent operations.

The construction of a $1,000,000 plant specially designed to provide the most modern production, control, and research facilities for all of the many types of specialized industrial finishes has been started at Fuller's South San Francisco factory. Until this new plant is completed, present Fuller and Nason facilities at San Francisco, South San Francisco, and Los Angeles, as well as Portland, Oregon, will be utilized.



Sketch showing the $1,000,000 industrial finishes plant at the South San Francisco factory of W. P. Fuller & Company as it will appear when completed

D. J. Tight, president of R. N. Nason & Company for many years, enters the Fuller organization as industrial advisor. Succeeding him as R. N. Nason & Company president is W. W. Holt, long a co-worker with Mr. Tight in the direction of that firm's affairs. In charge of the production end of the new Fuller-Nason Industrial Division will be W. P. F. Brawner, director of production for W. P. Fuller & Company. General Sales Manager H. S. Margetts will direct the industrial sales staff, which will operate as a part of the W. P. Fuller & Company general sales department. C. E. Ide will be in charge of Fuller accounts and Gloyd Stankard will direct and supervise the handling of all Nason accounts.

Wyandotte Chemicals Research Department Host to Regional Supervisors

The Wyandotte Chemicals Research Department at its second annual staff meeting was host to the regional supervisors of the J. B. Ford Division of the company. During the three meetings, featured talks were given by staff members of the Research Department and by Carter B. Robinson, vice president in charge of sales, J. B. Ford Division, and by W. F. Torrey, vice president of the corporation.

During the technical sessions, detailed accounts were given by Research Department members of the properties of the

Wyandotte Chemicals regional supervisors: (standing, left to right) Gordon Wood, midwestern; P. S. Spencer, sales manager, Pacific Division; G. T. Robinson, northwestern; Gail Eldridge, north central; Tom Jones, southern; and C. W. Troxell, central. Carter B. Robinson, vice president in charge of sales, J. B. Ford Division, is seated at the extreme right. Dr. Thomas H. Vaughn, director of research, is seated at the extreme left.

new Wyandotte synthetic detergent which is scheduled for production next fall, and of the buffing compounds now being produced by Wyandotte. Further technical information was presented by Dr. Thomas H. Vaughn, director of research, and by members of his department.

During the afternoon session, technical talks were presented which related to the various divisions of the Wyandotte Chemicals Research Department; namely, Analytical, Bacteriological, Chemical Engineering, Cleaning and Sanitation, Inorganic, Industrial, Laundry, Library, Organic, Patent, and Physical. The meetings were attended by the professional staff of the department, by an equal number of sales, development, and technical service personnel, and by five management executives.

United Chromium Limited Formed in Canada

United Chromium Limited, a subsidiary of United Chromium, Incorporated, has been formed to meet the increasing demand in Canada for "Unichrome"

James Guffie

processes and materials. The new company will handle all of United Chromium's organic coatings for product finishing and industrial maintenance, as well as its electroplating processes and materials. Offices are located at 15 Emily St., Toronto, Canada, where James Guffie will be in charge as manager.

Mr. Guffie, who has been with United Chromium, Incorporated for 18 years, is well known in Canada. For the past 8 years, he has worked in close cooperation with Canadian industry as a service engineer for United Chromium, Incorporated. In addition to his new managerial duties for United Chromium Limited, Mr. Guffie will continue to render technical assistance to licensees of United Chromium, Incorporated.

New Solvents Firm

The American Chemsol Corporation announces the opening of large bulk plant

Leonard Messer

facilities at Coraopolis, Pennsylvania, to service industrial users of cleaning and process solvents. Leonard Messer, a graduate of the University of Pittsburgh, has been elected president of the organization.

The technical division is headed by Louis Marchetto, also a graduate of the University of Pittsburgh. Mr. Marchetto has had extensive experience in the laboratory of a leading paint manufacturer and has devoted considerable time to the study of solvents and their application to industry.

McCracken Made Director of Research at Detrex

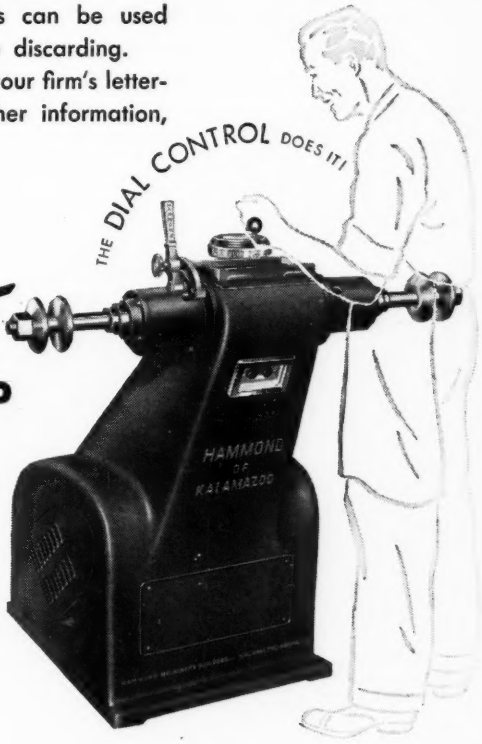
Doctor W. L. McCracken has been appointed director of research and manager of alkali manufacturing by the Detrex Corp., Detroit, Mich., according to an announcement by A. O. Thalacker, vice

SAVE ON WHEELS...STEP UP PRODUCTION

Speeds from 1,500 to 3,000 RPM are instantly available with the turn of the dial while the lathe is in operation. Polishing and buffing (cut-color-satin) can be done on one machine with no delays or lost motion.

The VROL Variable Speed Polishing Lathe definitely will step up production, and improve finish. Maximum wheel economy is assured, too, because efficient peripheral speed can be maintained at all times — wheels can be used right down to the flanges before discarding.

Tear out this page, attach it to your firm's letterhead, and mail it to us for further information, specifications and prices.



NEW

Hammond

VROL VARIABLE SPEED

POLISHING AND BUFFING LATHE

Hammond OF KALAMAZOO
GOOD MACHINERY SINCE '82

Hammond Machinery Builders INC.

1622 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

president and general manager. His promotion gives Dr. McCracken complete charge of chemical research and development engineering, as well as the chemical manufacturing operations carried on at the Detrex Hillview plant. This covers activities in both the industrial metal cleaning and dry cleaning divisions of the company. Dr. McCracken will serve

Dr. W. L. McCracken

under C. F. Dinley, Sr., vice president in charge of research and engineering.

Prior to the war, Dr. McCracken had charge of research and development for the third Detrex division, oil-extraction. He holds three degrees, B.S. (School of Mines and Metallurgy, University of Missouri), M.S. and Ph.D. (Iowa State), and is a member of the American Chemical Society and the Society of Oil Chemists.

Newark A. E. S. Open Winter Educational Session

The annual Open Winter Educational Session of the Newark Branch of the American Electroplaters' Society was held on March 7, 1947 at the Robert Treat Hotel, Newark, N. J. The branch considered itself fortunate in obtaining the services of the following outstanding speakers: John Kreml, Rustless Iron & Steel Co., Baltimore, Md., who discussed "Electroplating of Stainless Steel;" W. L. Hults, Schneffle Bros. Co., Newark, N. J., who talked on "The Economic Aspects of Electropolishing;" and Albert E. Howe, Federal Telephone & Radio Corp., Newark, N. J., who presented "An Introduction to Electropolishing."

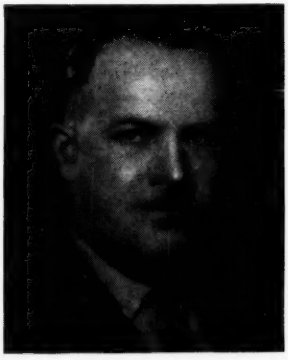
Fraser Appointed Assistant Manager

The appointment of O. B. J. Fraser as assistant manager of the Development and Research Division of The International Nickel Company is announced by Robert C. Stanley, president. For the past 13 years, Mr. Fraser has been director of technical service on International Nickel's mill products and, since March 1945, has also headed the Industrial Chemicals Section of the Development and Research Division in New York. For some years he has been directing International Nickel's investigational work at Mellon Institute of Industrial Research, Pittsburgh, Pa., on certain problems in the chemistry and technology of nickel.

Mr. Fraser is actively identified as both an officer and member of committees of a number of metallurgical and engineering organizations.

Detroit Sheet Metal Elects New President

At a recent meeting of directors of the Detroit Sheet Metal Works, Detroit, Mich., William V. Bush was elected president and Walter V. Baker, vice



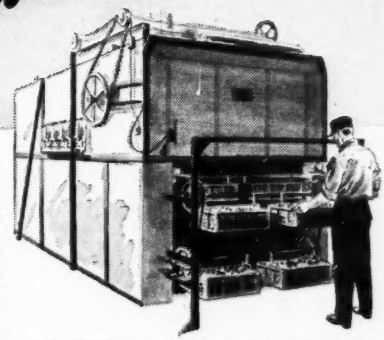
William V. Bush

president. Mr. Bush has been active in the management of the company for over 30 years and is well known to the trade.

Mr. Baker, eldest son of the last president, Wedworth V. Baker, recently returned from service in the United States Army in which he held the rank of major and was also the recipient of many honors.

WAA OFFERS AT LOW COST

Industrial Ovens



Baking and drying ovens, of specifications, sizes and types in common use but which today are not readily available, can now be purchased for prompt delivery from the War Assets Administration. Regardless of your specialized requirements, the odds are in favor of your needs being satisfied from this extensive surplus stock. Prices are so low that ovens may be converted from their original use when this is desirable and still permit a substantial saving to the purchaser.

There are ovens for the following uses: for baking lacquer, enamel, synthetic resin, japanning, for low temperature metal heat treating, for drying and curing chemicals, rubber, paper, lithographing, plastics, ceramics, etc.

Principal inventories are located at: Boston, Chicago, Cincinnati, Cleveland, Minneapolis, New York, Philadelphia, Richmond, St. Louis. Write the above Regional Offices requesting that your name be placed on their mailing lists for this type of surplus.

All furnaces offered subject to prior sale.

ALL FURNACES are sold under existing priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the materials offered herein.

EXPORTERS: Your business is solicited. If sales are conducted at various levels, you will be considered as a wholesaler. Any inquiries regarding export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

See our display booth

at Western Metal Exposition and Congress Show

at Oakland, California, March 22 to 27, 1947.

OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

838-3

Newcomers on Udylite Sales Staff

James E. Fitzgerald and Harvey E. Zens, Jr. have joined the sales organization of the Udylite Corporation and have been assigned to the Detroit office. Mr. Fitzgerald, a native Detroiter, served in

James E. Fitzgerald

the Coast Guard during the war and formerly attended Notre Dame and both Libbey Owens and the Ford Trade Schools. He has been associated with the

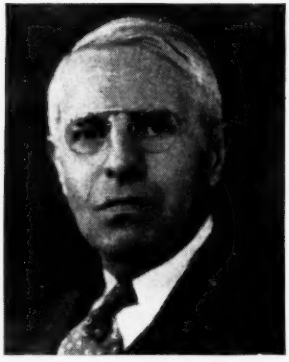
Harvey E. Zens, Jr.

Plymouth Motor Car Company, Nicolay Dancey and Howe Martz Glass Company.

Mr. Zens, also a native Detroiter, served as a captain in the Army Air Corps during the war and formerly attended Albion College and Wayne University. He has been associated with the Dodge Motor Company, Carboloy Company and Meier Brass and Copper Company.

Lewis L. Brastow Passes

Lewis Ladd Brastow, first sales manager of the Trumbull Electric Manufacturing Company and editor of the Trumbull "Cheer," died at his home in Plainville, Conn., on January 9 at the age of 72. A member of the Trumbull organization for 40 years, Mr. Brastow was one of the company's first employees. An outstanding figure in the electrical industry, his wide experience in sales and advertising work gave him an enviable reputation in the industry as well as with



Lewis L. Brastow

editors and representatives of the trade press.

Born in Burlington, Vermont, in 1874, Mr. Brastow attended Phillips Andover Academy and in 1896 was graduated from Yale University where his father was a faculty professor. Shortly after his graduation, he joined the newly formed Trumbull Electric Manufacturing Company. Appointed Trumbull's first sales manager, Mr. Brastow instituted the early sales policies of the company which, under his guidance during the following years, helped establish the Trumbull Company in its present high position as manufacturer of electrical equipment. Mr. Brastow spent a great deal of time in the field during his 25 years as sales manager and was widely known among distributors and contractors for his business ability, kindly advice, and helpfulness.

French Named Assistant Vice President

According to an announcement made by Robert C. Stanley, chairman and president, H. J. French has been appointed assistant vice president of The International Nickel Company of Canada, Limited. Since September 1943, Mr. French has been assistant manager of the Development and Research Division of the company. Previously, and for a period of 12 years, he was in charge of alloy steel development.

Optimus Detergents Appoints

Clarence M. Smith has been appointed field service representative for Central Pennsylvania by the Optimus Detergents Co., 334 Church St., Matawan, N. J., manufacturer of industrial cleaning materials.

Mr. Smith has had wide experience in the industrial cleaning field. A graduate of the Philadelphia College of Pharmacy, he joined the Philadelphia Chemical Supply Company of Harrisburg as a salesman in 1930. In 1941, he became sales representative for Central Pennsylvania for the Magnuson Products Corporation of Brooklyn. From 1942 to 1946, Mr. Smith represented the Magnus Chemical Company in its Baltimore territory.

Norton V. P. and G. M. Retires

The Norton Company announces the retirement of Howard W. Dunbar, vice president and general manager of the Grinding Machine Division, effective January 21, 1947. Mr. Dunbar came to Norton Company in 1913 as assistant chief engineer to Charles H. Norton. From that time on, he served as sales manager, assistant general sales manager, works manager, and since 1932 he has held the office of general manager of the Grinding Machine Division. Upon his retirement he also held a vice presidency and directorship in the company.

Previous to his association with the Norton Company, Mr. Dunbar was affiliated with the Stanley Instrument Co., Great Barrington, Mass.; Pike Adding Machine Co., Orange N. J.; J. M. Quimby, Newark, N. J.; and Western Electric Co., New York, in various executive capacities. He is the author of many technical articles and books, such as "The Principles of Cylindrical Grinding" and "Little Known Facts About Grinding."

Royer Heads U. S. Chemical Stoneware Sales

The appointment of Hubert Royer as sales manager of the Chemical Stoneware Division of The U. S. Stoneware Company is announced by Howard Farkas, vice president and general sales manager of the company and its various divisions.

Mr. Royer comes to U. S. Stoneware from the General Ceramics & Steatite Corporation. In his 27 years as a sales engineer for General Ceramics, he has built an industry-wide reputation both as a chemical and ceramic engineer. His

Hubert Royer

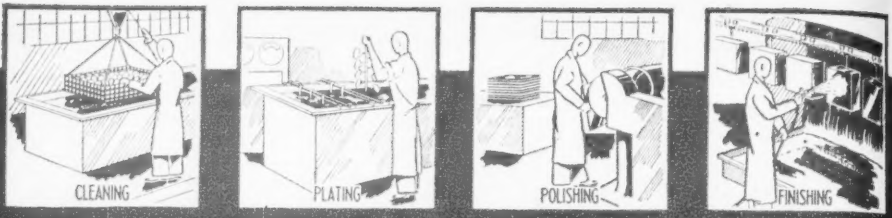
broad experience in the application of chemical stoneware to the process industries makes him excellently fitted to direct the sales of this important division of U. S. Stoneware.

Mr. Royer will be located in the New York office of U. S. Stoneware, 60 E. 42nd Street.

A. E. S. New England Regional Meeting

The Eighth Annual New England Regional Meeting of the American Electroplaters' Society is scheduled to be held in New Haven, Connecticut, on April 26.

The meeting will include educational sessions scheduled for 2:00 p.m. in the Hotel Taft Ballroom, and a matinee women's program to be held at 2:30 p.m. in the Shubert Theatre. A banquet, dancing, and entertainment, beginning at 7:00 p.m. in the Hotel Taft Ballroom, will round out the meeting, tickets for which are available at $5.00 each.



New Equipment and Materials

Youngstown Miller Filter Press

A vertical steel filter press of cast iron construction that combines plate and frame in one casting to permit easy removal of cakes has been developed by the Youngstown Miller Co., Belleville, N. J.

The unique combination of plate and frame enables quick and easy cleaning and removal of cakes through an individual latching arrangement of each frame. Starting with the top frame, each section is individually latched in an elevated position to permit the filter paper and cake to be pulled forward out of the press. The cake is quickly removed and the filter paper replaced. Frames are then relowered into position and tightened by a hand screw, forming a tight press. The filtering area is 31 square feet, with 2 cubic feet of cake space.

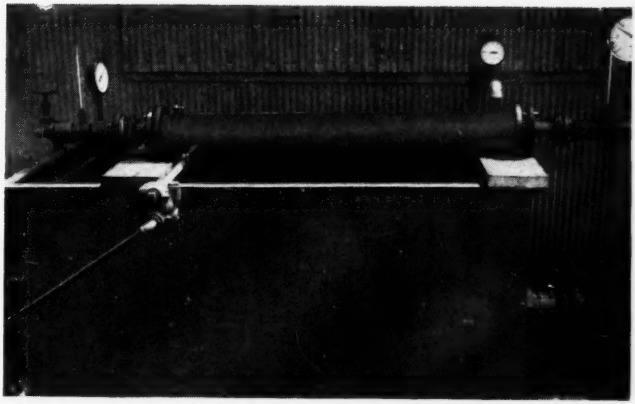
The press is said to be suitable for the filtration of many liquids including alkyd resins, solvents, paints, varnishes, soaps, linseed, castor and essential oils, and cutting oils and coolants.

Youngstown Miller Filter Press

"Spray-Peel" Strippable Plastic Compound

Designed to solve corrosive and abrasive problems encountered in the metal industry, a strippable plastic compound, to be known as "Spray-Peel" has been developed by Eronel Industries, 5714 W. Pico Blvd., Los Angeles, Calif. Readily applicable by the brush or spray method, the material, it is claimed, dries quickly to a rubbery film, has sufficient adhesion to ensure complete sealing, and has adequate tensile strength to permit easy stripping.

According to the manufacturer, Spray-Peel Strippable Plastic Compound is non-toxic and has unusual resistance to moisture, abrasion, salt water, aromatic spirits and oils, alkalis, acids, and all atmospheric temperatures.



Installation View of Durco No. 4 Heat Exchanger

Durco No. 4 Heat Exchanger

Incorporating an inner wall and baffle core made of an alloy containing 14½ per cent silicon (Duriron), the Durco No. 4 Heat Exchanger now being marketed by The Duriron Co., Inc., Dayton 1, Ohio, is said to safely handle practically any commercial acid, including all concentrations and temperatures of sulfuric acid, acetate acid, and nitric acid, as well as such corrosives as brine, nickel plating, chrome plating, and anodizing solutions. The steam (or coolant) is separated from the acid by a corrosive-resistant tube.

Designed for installation vertically or horizontally and weighing only 145 lb., thus allowing for easy handling, the Durco No. 4 Heat Exchanger can be connected in series or in parallel, and the Duriron parts can be removed without disturbing the steam (or coolant) inlet and outlet connections. The heat exchanger is constructed to handle an acid flow of from 4 to 14 g.p.m. with pressure drops of 5 to 34 feet. The heat transfer capacity of the unit used as a heater is 135,000 to 155,000 B.T.U. per hour with 74-lb. steam and inlet temperature of liquid between 70 and 130 deg. F. As a cooler, the unit has a capacity of 45,000 to 90,000 B.T.U. per hour, based on 100 deg. F. mean temperature differential. Other heat exchangers with heat transfer capacities up to 300,000 B.T.U. are also available.

"Phenoglaze" Phenolic Resin Coating

"Phenoglaze," a phenol-formaldahyde protective coating manufactured in England for use on all types of metal products, is now available to fabricators in this country through the Phenoglaze Sales Corp., 315 Broadway, New York 7, N. Y. The plastic film is said to be impervious to heat, moisture, and chemical action such as that of salt, gasoline, oil, alcohol, turpentine, acetone, and other corrosive agents.

Phenoglaze can be applied by the spray, brush, or dip method. It is available as a clear coating, as well as in colors. Its high resistance to galvanic influences and to acids and alkaline solutions is claimed to make it an ideal finish in the manufacture of such products as furniture, steel boats, cabinets, and other products where properties of protection and attractive appearance are required. It is air-drying and cold-setting.

Behr-Manning Cut-To-Length Rayon Flock

A complete line of cut-to-length rayon flock for industrial flock finishers is announced by the Electro-Textile Div., Behr-Manning Corp., Troy, N. Y. According to the manufacturer, the product is free-flowing and covers readily to yield a dense, uniform, velvet-like finish of unusually fine decorative and functional properties.

Behr-Manning Cut-to-Length Flock is fully described in a booklet and color guide entitled "Flock Finishing" now available from the company.

H-VW-M "Wrap-Rax" Tape

An orange-colored synthetic resin in easy-to-use tape form for insulating plating racks, to be known as "Wrap-Rax," is now being marketed by the

Hanson-Van Winkle-Munning Co., Matawan, N. J. According to the manufacturer, the tape can also be effectively used as a stop-off in hard chromium and other plating solutions.

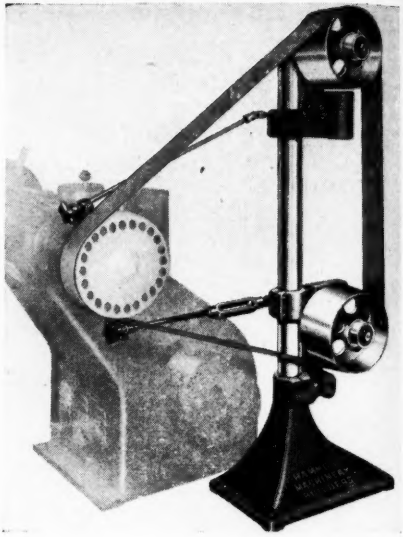
Quick and easy to apply, Wrap-Rax Tape is described as a tough plastic which resists abrasion and wear, as well as all cleaning, pickling, and plating solutions commonly used. Edges and flat surfaces of plating racks are said to be covered equally with the tape, which can be applied as readily as ordinary friction tape.

Designed to prevent disintegration of plating racks and to reduce current and metal losses to a minimum, Wrap-Rax Tape is furnished in 250-foot rolls, ¾ inch in width, and can be used on old as well as new racks.

Hammond Improved Nos. 3 and 4 Backstands

Improvements in the design of its No. 3 backstand for converting existing grinding and polishing equipment into high production abrasive belt machines for a wide range of finishing operations are announced by Hammond Machinery Builders Inc., 1622 Douglass Ave., Kalamazoo 54, Mich. The primary change is in the pulley, which is now of aluminum alloy construction. The pulley is mounted on sealed precision ball bearings and, being considerably lighter than the original fiber pulley, is said to eliminate difficulty in keeping the abrasive belt on the pulley and contact wheel in starting and during operation. In addition, the face of the pulley does not load up with metal and composition, with the result that pulley life is greatly extended, the manufacturer claims.

Hammond Improved No. 3 Backstand



Hammond Improved No. 4 Backstand

A similar improvement has been made in the company's No. 4 two-pulley backstand, which supplements the No. 3 backstand and is recommended for use where floor space prevents employment of the No. 3. Both backstands are designed to accommodate abrasive belts up to 6 inches wide and can be supplied for either right or left-hand operation. The No. 3 backstand measures 43 inches high overall x 20½ inches wide overall x 26 inches long overall and has a net weight without belt guard of 375 lb. The size of the base at the floor is 15 x 23 inches.

The No. 4 backstand measures 6 feet 4 inches from the floor to the top of the belt guard and is 15½ inches wide overall. The size of the base at the floor is 15½ x 24 inches, and the net weight of the unit without belt guard is 460 pounds.

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

"Jewelry-Finish" Process for Aluminum

A process for producing reflective mirror-like finishes on the surfaces of aluminum and aluminum alloys, to be known as the "Jewelry-Finish" Process, is announced by the Technical Processes Div., Colonial Alloys Co., Ridge Ave. and Crawford St., Philadelphia 29, Pa. Aluminum surfaces which are free of scratches, roll or draw marks, spinning lines, and other surface imperfections are said to respond to the treatment with bright chrome-like results. The wrought aluminum alloys are claimed to respond to the reflective treatment better than cast alloys due mainly to the lack of surface porosity. Those wrought alloys which are said to react most favorably are Nos. 2S, 3S, 52S, 53S, 17S, 56S, 24S, 61S, Alclad, Pureclad, and similar compositions.

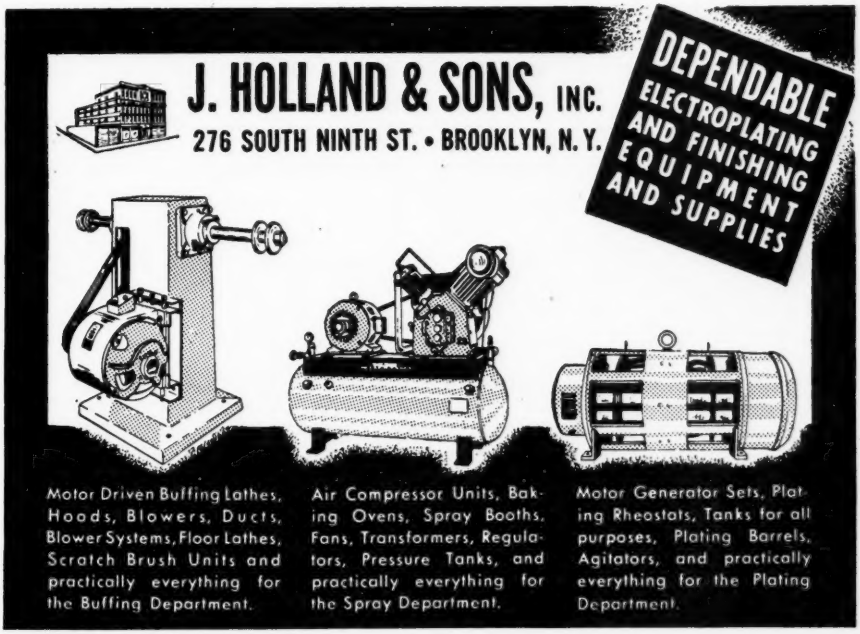
While large surfaces may be treated with the Jewelry-Finishing Process, small objects or parts, such as screws, nuts, bolts, fittings, tubing, washers, stamped, drawn and extruded parts, lend themselves to greater production. Mirror-type reflective finishes are but one type of finish which can be obtained with the process. Diffuse reflective finishes, as well as matte-white effects, can also be obtained.

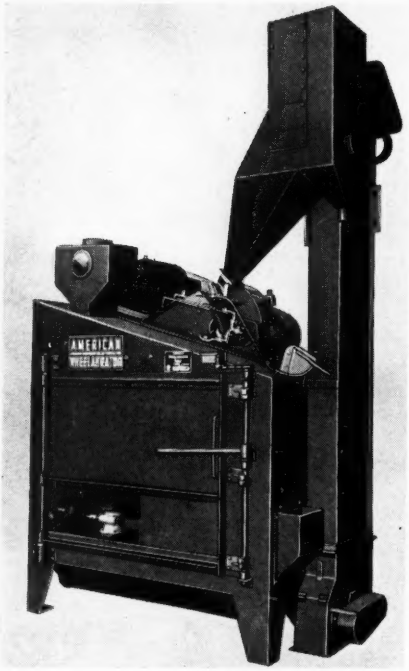
In addition to the value of the surface appearance, the treatment passivates the aluminum surfaces so as to provide for maximum resistance to tarnish and corrosion. The passivated surfaces are said to afford good bases for subsequent lacquering, plating, and anodizing. Surfaces that have been Jewelry-Finish processed are said to retain their high lustrous brilliance. An additional advantage claimed for the process is that deeply recessed and difficult-to-reach areas are benefitted as readily as easily accessible surfaces.

American 48-Inch Wheelabrator Swing Table

The American Wheelabrator & Equipment Corp., 555 S. Byrkit St., Mishawaka, Ind., announces the addition of a 48-inch Wheelabrator Swing Table to its standard line of tumblasts and tables.

The machine is equipped with one 19½ x 2½-inch airless Wheelabrator blast


J. HOLLAND & SONS, INC.
276 SOUTH NINTH ST. • BROOKLYN, N. Y.
DEPENDABLE ELECTROPLATING AND FINISHING EQUIPMENT AND SUPPLIES
Motor Driven Buffing Lathes, Hoods, Blowers, Ducts, Blower Systems, Floor Lathes, Scratch Brush Units and practically everything for the Buffing Department.
Air Compressor Units, Baking Ovens, Spray Booths, Fans, Transformers, Regulators, Pressure Tanks, and practically everything for the Spray Department.
Motor Generator Sets, Plating Rheostats, Tanks for all purposes, Plating Barrels, Agitators, and practically everything for the Plating Department.



American 48-Inch Wheelabrator Swing Table

cleaning unit and is said to be ideally suited for cleaning large, bulky, fragile work such as normally would require an airblast room.

Pen-Kote 590 Rack Coating

An odorless, non-inflammable plastic rack coating which, it is claimed, can be applied in any plating plant without special precautions is announced by the Peninsular Chemical Products Co., Van Dyke, Mich. Known as Pen-Kote 590, the material consists of an aqueous dispersion of Saran plastic and contains no organic solvents. It is described as tough, flexible, and highly resistant to all plating and cleaning solutions, including chlorinated degreasing solvents.

Pen-Kote 590 is designed for application by hand dipping and is said to dry in less than an hour at room temperature, affording complete protection in 24 hours. Since it is an aqueous dispersion rather than a solution, the material is claimed to be exceptionally free-flowing, draining rapidly without forming webs or strands to be trimmed off after dipping.

GOLD PLATING SOLUTIONS

In All Colors

Guaranteed 100% Pure Gold Content
Troy Weight - Color Constant
Tarnish Resistant
Proven Quality by the Acid Test

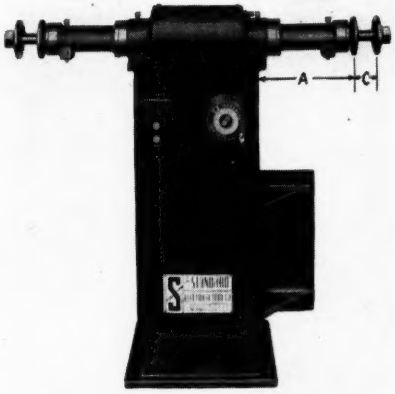
Write or call our experts about your plating problems

Davis-K-Products Co.
114 Lexington Ave., New York 16, N. Y.
Lexington 2-7360
2-5816

Standard Redesigned Infinitely Variable Speed Buffing and Polishing Machine

A redesigning of its infinitely variable speed buffing and polishing machine in the 2 and 3 h.p. sizes is announced by The Standard Electrical Tool Co., 2518 River Rd., Cincinnati 4, Ohio. The accompanying illustration shows a machine of enclosed spindle construction with four ball bearings, sight feed oil gage on each bearing housing, and shaft lock. If desired, the machine is also available with an exposed or open spindle.

Standard Redesigned Infinitely Variable Speed Buffing and Polishing Machine



The enclosed ball bearing motor is located on an adjustable base attached to the back of the pedestal, with power transmitted to the spindle through a belt drive. Any spindle speed between 1,500 and 3,000 r.p.m. can be instantly obtained by merely turning the "Speedial" control on the front of the machine. Each change in spindle speed is immediately recorded on the dial. The drive is properly guarded to afford maximum operator protection.

The machine is supplied complete with push-button safety starter overload protection, and is available in nine models ranging from 1 to 15 horsepower.

Speare's Safety Siphon

Made of an inert plastic, a safety siphon which can be used to draw acids from carboys of from 5 to 13 gallons inclusive and also from the side bung of 50 to 55-gallon drums is announced by The Alden Speare's Sons Co., 126 Sixth St., Cambridge, Mass. The siphon is primed by a built-in pump. Thereafter, no further action is said to be required. The entire contents of the carboy may then be discharged with the siphon by manipulation of the flow control valve, which may be adjusted to the desired rate of flow.

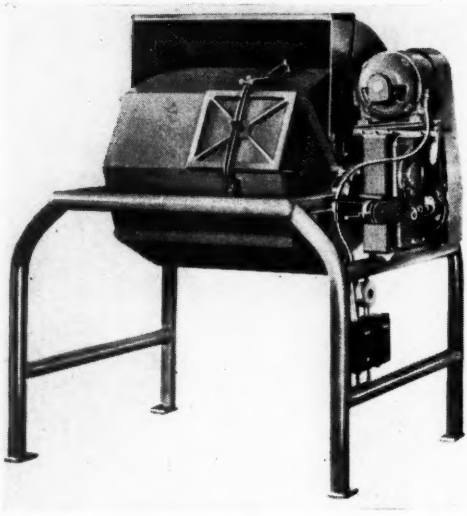
Speare's Safety Siphon in Use

Grainlock
Polishing Wheel Cement

We Do Not Send Samples
Better Still, We Bring Them To You
Your Job Is Set Up To Your Entire Satisfaction
You Cannot Beat This Offer or The Results Obtained

Write Us Today

INDUSTRIAL LUBRICANTS COMPANY
5736 TWELFTH STREET DETROIT 8, MICHIGAN



Almco Octagonal Deburring and Finishing Barrel

The plastic used in the construction of the Speare's Safety Siphon is claimed to be unaffected by all grades of commercial acids, as well as by alcohol or water, and is said to have a wide range of usefulness in transferring liquids tending to have a contaminating effect on metal.

Almco Octagonal Deburring and Finishing Barrel

An octagonal deburring and finishing barrel of 30-inch diameter is now being offered by Almco Inc., 231 E. Clark St., Albert Lea, Minn., in 11 sizes from 32 to 60 inches in length with 9 standard compartment sizes from 12 to 60 inches long. Design features include a four-speed drive, quick-clamp doors, and welded steel construction throughout.

The Almco Deburring and Finishing Barrel can be furnished either plain (unlined) or with full Neoprene lining, and is motor driven at approximately 10, 15, 20, or 30 r.p.m. through a speed reducer and four-step V-belt pulleys, a lever-operated belt release mechanism permitting quick selection of the desired speed. To facilitate positioning of the barrel for loading and unloading, rotation in both directions is controlled by a start-stop lever which applies an hydraulic brake when in the "stop" position.

The compartment doors of the unit are light in weight (21¼ lb. each for a 16-inch compartment) and are opened and closed by means of quick-acting toggle clamps. The clamping levers permit the doors to be cracked open for draining the compartments before unloading. Each door has a water-tight sponge rubber seal with take-up adjustment to compensate for eventual compression of the seal. For rapid and complete unloading, door openings extend within ¾ inch of the compartment end walls.

The Almco Octagonal Deburring and Finishing Barrel is mounted in a welded tubular steel frame which permits ready access to the doors for loading the unit. To permit unloading directly into a work pan or onto a screen, a 28-inch clearance is provided beneath the barrel. The barrel itself has an approved guard rail and pull-down safety hood, and the driving mechanism is fully enclosed for safety.

RANDALL for TANKS
ALLOY — RUBBER — LEAD
GAS—STEAM—ELECTRIC HEATED
—DEGREASERS—
POLISHING LATHES
EXHAUST SYSTEMS
RANDALL WELDING WORKS
410-412 E. 93rd St. New York 28

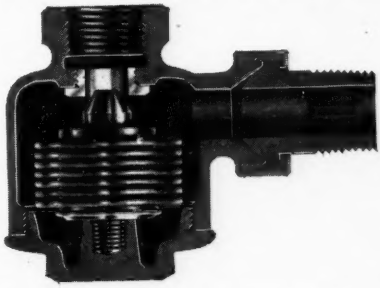
Nicholson Type R Radiator Trap

Designated as the Type R, a radiator trap for vapor and steam heating service is now being introduced by W. H. Nicholson & Co., 12 Orange St., Wilkes-Barre, Pa. The trap is a thermostatic bellows type utilizing a patented balanced vapor-pressure principle which provides for maximum valve opening with slight temperature difference between steam and condensate. The unit is designed to afford positive operation on vacuum or vapor pressure heating systems up to 25

lb. without adjustment or change of the valve orifice. The valve is wide open when the trap is cold and closes immediately when steam contacts the bellows. The large diameter valve orifice and multiple bellows convolutions afford large water and air discharging capacity.

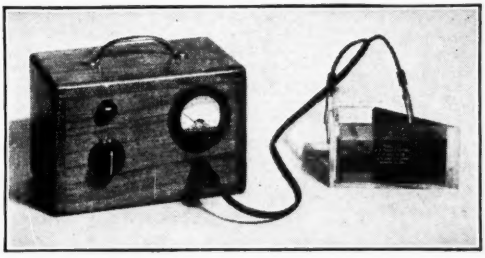
The bronze bellows of the Nicholson Type R Radiator Trap is formed from seamless tubing by a hydraulic process. An internal stop is provided to prevent excessive compression of the bellows. The nickel alloy valve is welded to the natural heavy closed end of the bellows tubing, forming an integral unit which is said to assure alignment of the valve and bellows. The valve is provided with a renewable stainless steel seat, and the body, cap, and union of the trap are made of corrosion-resistant brass. The exterior of the unit is provided with a dull nickel-plated finish.

The Nicholson Type R Radiator Trap is available in two models designated as the Series 2A and Series 4A. Both models are intended for draining condensate and air from vacuum and vapor heating devices up to 25 lb. maximum pressure. The Series 2A has a nominal capacity of 200 square feet equivalent direct radiation at 1½ lb. pressure differential, and the Series 4A has a nominal capacity of 400 square feet equivalent direct radiation at 1½ lb. pressure differential. Both models are made in angle types only in ½ and ¾-inch pipe sizes with male union inlets and female pipe thread outlets. The Series 2A incorporates a large diameter bellows with seven convolutions and the Series 4A a large diameter bellows with twelve convolutions, both designs permitting maximum valve lift without overstressing of the bellows metal by excessive deflection.



Sectional View of Nicholson Type R Radiator Trap

NOW, CLEAR PLASTIC HULL CELLS ARE READY!



SEE IT PLATE AND COVER!
(For solutions up to 165° F.)

HULL CELL TEST SET

IF YOU PLATE

Brass, Cadmium, Chromium, Copper, Nickel, Silver, Tin, Zinc

YOU CAN'T AFFORD NOT TO USE THE HULL CELL

To Control Your Plating Baths

ROHCO

R. O. HULL & COMPANY, INC.

1279 West Third Street

Cleveland 13, Ohio

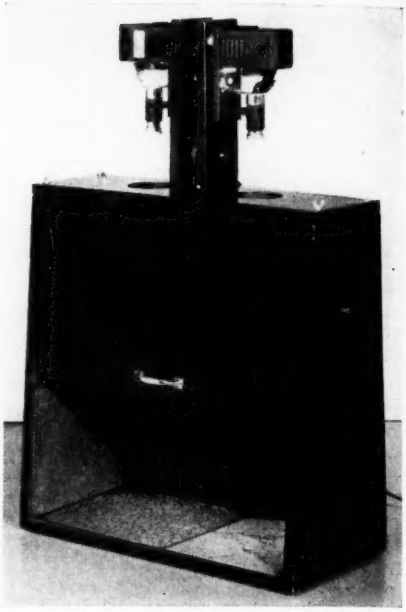
"YOUR PLATING IS BEST WITH THE HULL CELL TEST"

"Faxfilm" Model D-30 Dual Projection Unit

Machined finishes are said to be easily controlled by the use of the "Faxfilm" Model D-30 Dual Projection Unit now being introduced by The Faxfilm Co., Room 565, 1220 W. Sixth St., Cleveland 13, Ohio. The unit is designed to provide a quick, accurate comparison of a production finish with a standard finish and may be used with curved and conical shapes and inside or outside diameters, as well as on flat surfaces. Readily portable, the unit weighs 27 lb. and requires two square feet of bench space.

In the Model D-30, Faxfilms (plastic replicas) of a standard finish and of a production finish are projected by means of two micro-projectors mounted at the top of the case, the images appearing side by side at 30 diameter magnification on a screen at the base of the case. Openings on either side of the case permit the operator to view the images, measure them or point to specific areas in a discussion of them. The Wollensak 1-inch f:2.46 lenses are said to provide excellent definition of minute surface irregulatrities to show the differences between the standard and the work specimen. Rheostats for each projector equalize the intensity of the light for maximum accuracy in comparison.

Higher magnification can be obtained by turning the projectors to project horizontally on a wall or screen, one diameter of magnification being obtained for each inch of projection distance. The unit may be operated on 110-120 volts, alternating or direct current.



"Faxfilm" Model D-30 Dual Projection Unit

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FOR DETAILS WRITE

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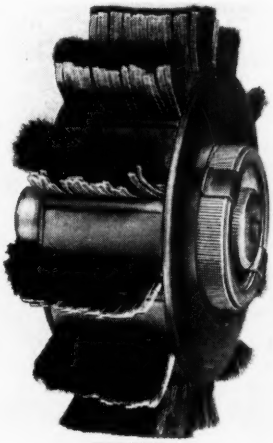
Sand-O-Flex Model 650C Contour Sander

Designed for use in finishing and sanding irregular surfaces or edges, a heavy duty model of its contour sander, designated as the 650C, is announced by the Sand-O-Flex Corp., 4373 Melrose Ave., Los Angeles 27, Calif. The sander, which can be used on practically any rotating shaft, has 12 brush-backed abrasive strips which are fed out as needed from an internal cartridge. As the unit is rotated, these strips are forced into, around, and over the particular surface or contour.

The Sand-O-Flex Model 650C can be used for sanding and finishing operations, for "satin" finishing, for removing rust, scale, and toolmarks, and for deglossing. The unit has a 6⅝-inch housing and 10¾-inch overall diameter, including height of brushes. The abrasive strips are 2½ inches wide, and refills are available in various grits and grades, scored or unscored, in aluminum oxide and garnet cloth. Fully loaded, the unit weighs 7½ lbs. The design includes a ¾-inch bore which enables the sander to be mounted on a right or left-hand shaft of a buffing and polishing lathe, electric motor, drill press, flexible shaft equipment, or wood or metal-working lathe, as well as a mandrel.



Sand-O-Flex Model 650C Contour Sander

Ethone Enamel Stripper S-45

Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Conn., has developed a spot enamel stripper designated as S-45 for the removal of synthetic enamel and other coatings. The stripper is recommended for the stripping of enamel on large parts that cannot be immersed in a stripping solution.

Enthone Enamel Stripper S-45 is a slightly viscous liquid that can be brushed, sprayed, or applied by dipping to the work to be stripped. It contains a non-waxy evaporating retardent that keeps the stripper on the work until stripping action is completed. Stripping is accomplished by a wrinkling action so that the enamel can be brushed, wiped, or scraped off. No waxy residue is left to interfere with adhesion of subsequently applied finishes, the manufacturer claims.

The stripper is stated to have very fast action on most synthetic enamels, as well as certain nitrocellulose coatings. It is said to be unsatisfactory for linseed oil paints, phenol-formaldehyde enamels, or vinyl type coatings. Modified urea-formaldehyde, melamine, and alkyd coatings can be rapidly stripped by means of the stripper, which is claimed to have no harmful action on metals, and so on.

Arco Rubber Insulated Plating Tank Grid

The rubber linings of plating and pickling tanks are said to be protected through the use of a seamless rubber covered mesh grid now being offered under the trade name of Arco by the Automotive Rubber Co., Inc., 8607 Epworth Blvd., Detroit 4, Mich. According to the manufacturer, tank linings and agitation coils are protected by the rubber insulated grid against damage from heavy or sharp parts which may be dropped in the

Arco Rubber Insulated Plating Tank Grid

tank or by contact from baskets and handling equipment, with the result that frequent tank relining is eliminated. Moreover, the seamless rubber coating is said to prevent contamination of the plating solution resulting from the corrosion of exposed metal equipment.

The Arco Plating Tank Grid is constructed of expanded metal reinforced with angle iron and supported on heavy channel iron. Lifting eyes are provided for easy removal of the grid to allow for cleaning of the tank and for retrieving fallen parts.

"Polytherm" Baking Enamel

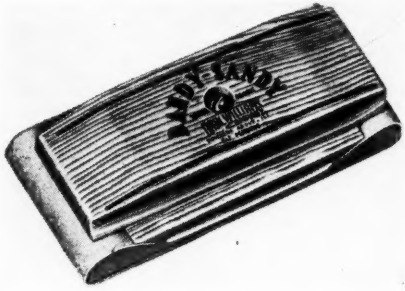
A heat-resistant baking enamel which is said to be capable of withstanding temperatures of more than 500 deg. F. without yellowing has been announced by the Interchemical Corporation—Finishes Division, 350 Fifth Ave., New York 1, N. Y. Easy to apply, the enamel, which is known as "Polytherm," can be sprayed at extremely high solids content and bakes to a hard, smooth, lustrous finish with excellent hiding qualities, high gloss, and freedom from orange peel, it is claimed.

In addition to its unusual heat resistance, Polytherm, according to the manufacturer, has unusual color retention, is unaffected by hot fats and grease, and is immune to most chemicals, including alkali. Should Polytherm-finished surfaces be damaged by abuse or careless handling, they can be refinished easily in the field, it is stated.

Polytherm Enamel is made in white, black, and colors. Within reasonable limits, color is no problem and any shade can be matched to suit individual needs, the manufacturer states.

"Dandy Sandy" Hand Sander

Known as the "Dandy Sandy," an easy-to-use hand sander which is designed to hold standard size sheets of sandpaper has been introduced by the Dahl-Williams Co., 4040 Sterling Rd., Downers Grove, Ill. Small and compact, the sander measures 7 inches long overall x 3 inches wide. A standard size sheet of sandpaper is said to fit neatly into the unit by simply folding the sheet of sandpaper twice lengthwise.



"Dandy Sandy" Hand Sander

The Dandy Sandy Hand Sander is furnished complete with a sheet of sandpaper properly inserted. When one surface of the sandpaper has become worn, a new surface can be provided by simply turning the superstructure and inverting the fold of the sandpaper. The sander is made from specially selected wood which is given a high finish and is provided with finger-fitting grooves to afford maximum comfort while sanding. According to the manufacturer, the sander can be effectively used on a wide variety of metal, leather, and wood products, including boats, cars, furniture, toys, and so on.

ALLWOOD

"Vienna Brand" Lime

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

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New Literature

"A New Surface Treatment for Aluminum" is the title of a four-page illustrated reprint now being distributed by the American Chemical Paint Co., Ambler, Pa., which describes ACP "Alodine," a material for aluminum that is designed to provide high corrosion resistance and a lasting bond for organic finishes. Copy free upon request.

Porter-McLeod Hydraulic Mirror Finishing and Glazing Machine for the glazing and mirror finishing of all types of cutlery, wrenches, and flat tools is fully illustrated and described in a six-page folder prepared by the Porter-McLeod Machine Tool Co., Inc., Hatfield, Mass. Specifications of the two models in which the machine is available are also listed in the folder, copy of which is available free upon request.

"Spec" Quality Products. A 24-page pocket-size illustrated booklet published by the Special Chemicals Corp., 38 Irving Pl., New York 3, N. Y., contains descriptive and price list information on "Spekwite" tri-metal alloy white electroplate; "Spekyello" tri-metal alloy yellow plate; "Dipwite" white decorative finish; "Smutbath" alloy electroplate; "Kwikflux" soldering and brazing flux; "Spectrifier" selenium rectifiers; "Spekleen" No. 51 rust-inhibiting compound; "Specorak" plating racks; "Spekaluminite" aluminum baked coating; and other products. Copy free upon request.

"Shot Peening." In an effort to bridge the gap between the technical expert and the prospective user of the shot peening process, the American Wheelabrator & Equipment Corp., 555 S. Byrkit St., Mishawaka, Ind., has published a 128-page textbook on shot peening which provides, under one cover, a complete and detailed explanation of the process for the use of engineers and production men who are actively interested in the application of shot peening.

The first part of the book is devoted to a discussion of the applications and advantages of shot peening and the equipment and procedures involved. The second part covers the theory of prestressed surfaces in relation to shot peening.

The book is nominally priced at $1.50, however, it will be sent free of charge to all interested executives addressing requests on their company letterheads.

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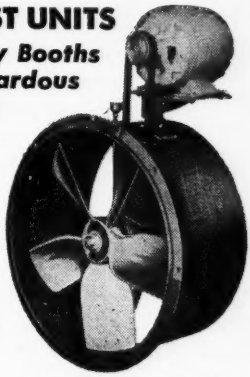

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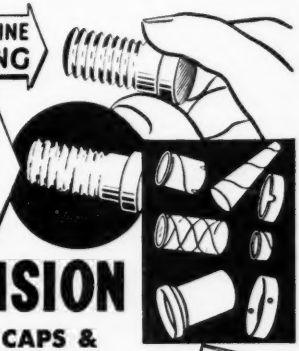

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The Finishing Touch

By J. A. Patterson

"Oh yeah! Step outside and say that!"

Park Heat-Treating Materials and Factory Aids. The Park Chemical Co., 8074 Military, Detroit 4, Mich., has prepared a 36-page booklet which illustrates and describes heat-treating materials and chemical specialties intended for industrial use, including a variety of salts for heat treating; carburizers; quenching and tempering oils; protective coatings for steel; polishing cement; infra-red dryers; metal cleaners; degreasing fluid; solvent cleaner, and so on. Copy free upon request.

"Hydro-Flow" Washer for industrial plants is featured in a six-page illustrated and descriptive folder published by the International Conveyor & Washer Corp., 652 E. Fort St., Detroit 22, Mich. Facilities of the company for building industrial washers for every type of business are also discussed, and blueprints of conveyors designed to carry any shaped part through washers, as well as of special types of nozzles available for all classes of work, are included. Copy free upon request.

ACP Chemicals, Coatings, and Inhibitors. An eight-page catalog listing in handy reference form some of the more widely used ACP metal-working chemicals and processes has been prepared by the American Chemical Paint Co., Ambler, Pa. Useful in selecting materials best suited to production requirements, the catalog includes a description of inhibitors, rustproofing processes, metal cleaning chemicals, protective coatings, and specialized products essential in fostering and maintaining conditions requisite to a successful finish. Copy is available free by requesting Technical Service Data Sheet No. P-100-21.

Houghto-Clean "200" Series Cleaners. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa., now has available a four-page folder describing 17 metal cleaning compounds embodying latest scientific developments in detergency, wetting out, and new alkalis. These include maintenance cleaners; cleaners for non-ferrous metals; special purpose cleaners (for cleaning prior to vitreous enameling, for paint stripping, for cleaning after salt bath treatment and liquid carburizing, and for removing polishing compounds); electrolytic cleaners; and ferrous metal cleaners for tank and pressure washers. Copy free upon request.

Opportunity Section

SALES ENGINEER to sell special and standard metal parts washing machines, also new type foundry cleaning mills. Engineering background preferred but not essential. Territory available western New York state and sections of Canada. State age, education and experience in first letter. Write Box 32, Products Finishing, 431 Main Street, Cincinnati, Ohio.

THIS Opportunity Section is available for classified advertisements featuring equipment, employment, business opportunities, etc., in the industries devoted to the cleaning, plating, polishing and finishing of metals. For advertising rates and other information address:

PRODUCTS FINISHING
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CATALOGS

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Conveyors
Straight-line, loop-around, dual-strand, belt, and special conveyors are described and their use in a wide variety of operations and installations illustrated in an eight-page catalog published by Jensen Specialties, Inc., 9331 Freeland, Detroit 27, Michigan.

2. Surface Conditioning
Oakite CrysCoat Process, a precise surface-conditioning procedure for cleaning, rustproofing, and phosphatizing steel parts in one quick application, is the subject of a special service report released by Oakite Products, Inc., 32F Thames St., New York 6, New York.

3. Metal Cleaning Equipment
A folder telling how seven famous companies solved their production cleaning problems is now being issued by The Alvey-Ferguson Co., 631 Disney St., Cincinnati 9, Ohio.

4. Centrifugal Dryer
The Dellinger Mfg. Co., 729 N. Prince St., Lancaster, Pa., is now offering a fully illustrated bulletin showing the Kreider Centrifugal Dryer in use and giving complete specifications.

5. Plating Rectifiers
Copper-oxide rectifiers and controls for electroplating and anodizing are the subject of a catalog issued by the General Electric Co., Section A1251-70, Appliance and Merchandise Dept., Bridgeport, Connecticut.

6. Spray Equipment
A 44-page three-color catalog published by the Eclipse Air Brush Co., 424 Park Ave., Newark 7, N. J., describes a complete line of low pressure spray equipment, including manual and automatic spray guns, nozzles, tips, pressure tanks and control heads, portable painting units, stationary compressors, and air-motored agitators.

7. Wrinkle Finishes
A bi-monthly report on wrinkle finish developments and applications and listing approximately 200 manufacturers of wrinkle finishes and coatings is now being offered by New Wrinkle, Inc., 1765 Springfield St., Dayton Ohio.

8. Conveyors for Infra-Red Layouts
The use of conveying systems in infra-red drying and baking operations is graphically described in Bulletin 150 issued by the Gifford-Wood Co., 420 Lexington Ave., New York 17, New York.

9. Solvent Degreasing
A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants and describes typical kinds of degreasers has been published by the Detrex Corp., Box 501, Roosevelt Park Annex, Detroit 32, Michigan.

10. Prufcoat
A material for application to concrete, structural steel, floors, pipes, tanks, and machinery for protection against acids,